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Third Edition Rewritten

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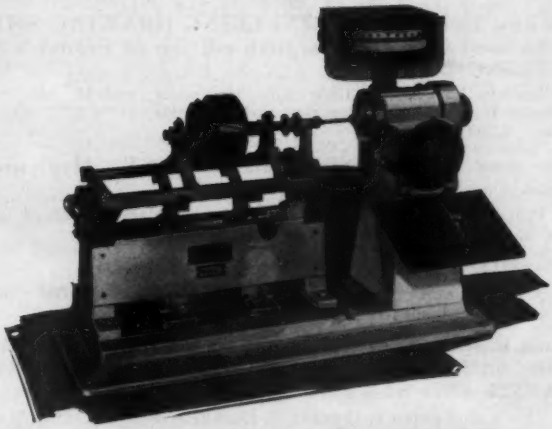

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HARRY PARKER HAMMOND

President Hammond was born at Asbury Park, New Jersey, December 21, 1884. After attending the public schools of Atlantic Highlands, New Jersey, and Wilmington, Delaware, he entered the University of Pennsylvania, from which he was graduated in 1909 with the degree of Bachelor of Science in Civil Engineering. Subsequently he was awarded the degree of Civil Engineer by the University of Pennsylvania, and the honorary degree of Doctor of Engineering by Case School of Applied Science.

Immediately after graduating from Pennsylvania he was appointed Instructor in Civil Engineering at the same institution, a position he held for two years. During 1911–1912 he occupied a similar position at Lehigh University. In 1912 he was appointed Assistant Professor of Civil Engineering at Polytechnic Institute of Brooklyn, and has served there continuously since that year in the successive capacities of Assistant Professor, Professor of Sanitary and Hydraulic Engineering and, since 1927, Professor of Civil Engineering and head of the Department.

Professor Hammond's employment in professional practice, in which he has engaged simultaneously with his teaching, has included work with a number of organizations: American Bridge Company; Board of Water Supply of the City of New York (Catskill Aqueduct project); J. A. Colby, Alexander Potter, and Andrew J. Provost, Jr., Consulting Engineers; Miami Conservancy District (Ohio); and other organizations. He has also been employed in connection with surveys of institutions and systems of higher education, including those of Brown University and the states of Georgia and Missouri.

During the World War he served as Chairman of Local Board for Division 58, New York City, under the Selective Service Act.

He is a member of Tau Beta Pi, Delta Kappa Pi, Pi Kappa Phi, American Society of Civil Engineers, American Association for the Advancement of Science, and American Association of University Professors.

He has served the Society for the Promotion of Engineering Education as Associate Director of the Investigation of Engineering Education, 1924–1929; Director of the Summer School for Engineering Teachers, 1927–1933; Member of Council, 1927–1930; Vice-President, 1934–1935; and as member or chairman of a number of committees, including, 1924–1936, the Committee on Graduate Study under which a comprehensive study of graduate work in engineering has been conducted in coöperation with the United States Office of Education. At present he represents S. P. E. E. on the Engineers' Council for Professional Development. In that capacity he is a member of the Council's Committee on Engineering Schools which is engaged in the examination and accrediting of the engineering colleges of the country.

Herman Schneider

HERMAN SCHNEIDER, Dean, University of Cincinnati, awarded the ninth Lamme medal by the Society for the Promotion of Engineering Education at its forty-fourth annual meeting at the University of Wisconsin, Madison, Wis., June 25, 1936.

Herman Schneider was born at Summit Hill, Pennsylvania, September 12, 1872. He was graduated from Lehigh University with the Degree of Bachelor of Science in Architecture in 1894. Prior to entering Lehigh University he was a helper on a construction gang and on surveying parties and while in college organized for himself a plan by which he worked during the school year and summer vacations in the office of an architect and engineer, starting as a blue print boy and ending as a designer at graduation. After graduation he was employed in construction work, including bridge construction in the northwest.

In 1899 he became Instructor of Civil Engineering at Lehigh University, and in that year proposed the co-operative plan of education. Efforts to find a sponsor for the plan were unavailing and in 1903 he went to the University of Cincinnati as Professor of Civil Engineering. In 1906 the Board of Directors of the University of Cincinnati approved the adoption of the co-operative system and made him Dean of the College of Engineering. The first co-operative class in engineering began its work in September, 1906, with an enrollment of twenty-seven students. The beginning courses were in chemical, mechanical, and electrical engineering. In accordance with a broad plan of development, other courses in engineering were added from time to time. In the subsequent unfolding of the plan, co-operative courses in commerce were inaugurated in 1919 and the College of Engineering became the College of Engineering and Commerce.

In 1920 organized research work was begun by the opening of the Leather Research Laboratory of the Tanners' Council of America, and The Institute of Scientific Research was established. Later the Lithographic Research Laboratory and the Basic Science Research Laboratory (combining and correlating the natural sciences) were added. In 1924, a Resource Survey was begun, covering the territory within a radius of three hundred miles of Cincinnati.

In 1922 the School of Applied Arts was inaugurated by the introduction of a Department of Architecture. This was followed by the addition of the Departments of Landscape Architecture, Interior Decoration, Art Applied to Industry, and Ceramics. Evening courses were begun in 1919.

In 1911 the University of Pittsburgh conferred upon Dean Schneider the Degree of Doctor of Science. From 1928 to 1932

he was drafted to the Presidency of the University of Cincinnati pending the selection of a President. In 1933 the University of Cincinnati conferred the Degree of Doctor of Laws on Dean Schneider and made him President-Emeritus of the University.

For the period of the war Dean Schneider was in charge of the economic phases of the Ordnance Department's program. From 1911 to 1913 he was a member of the Committee on School Inquiry of the City of New York, and later he became consulting expert, particularly on budgetary matters, for the New York Board of Education.

At the present time Dean Schneider heads, at the University of Cincinnati, the interrelated combination comprising the Institute of Scientific Research, the College of Engineering and Commerce, and the School of Applied Arts, the whole being co-ordinated into a definite and sequential pattern.

THE LAMME MEDAL

Awarded by the Society each year to a chosen technical teacher for accomplishment in technical teaching or actual advancement of the art of technical training

OUR SOCIETY AND ONE OF ITS PROBLEMS

By H. P. HAMMOND, President of the Society

Like many other similar organizations our Society had what are called "modest beginnings." It developed in numbers and influence slowly during its first twenty years; but during the last twenty years, and especially since about 1923, it has gained strength with steadily increasing momentum. It now occupies a position of influence and importance not only in its own particular field but also among similar bodies in higher education and among the societies of professional engineers.

It may be well now to take account of stock and to consider one or two of the problems that have grown out of the very success that we have some right to consider with satisfaction. A summary of some of the facts that are quite familiar to us may not only be of interest in itself but, it is hoped, suffice to form the background from which one of our present problems may be considered.

Our membership at present comprises about 2,400 individuals and 120 institutions. These numbers are perhaps forty per cent of the individual teachers who are concerned to an important degree with engineering instruction and about eighty per cent of the institutions that confer engineering degrees in this country. It may be noted, incidentally, that while these figures are gratifying, it is entirely correct to say that our individual membership should be at least doubled, since virtually every teacher and administrator concerned with engineering education should be a member of the Society, reading its publications and participating in its activities.

Of our individual members, about one seventh are actively concerned with the Society's regular operation as officers or members of committees of its Divisions, Sections, and Branches.

At the recent annual meeting the total attendance of members and guests was nearly 1,200, and even more interesting and significant is the fact that the program of the meeting comprised over two hundred listed items and that, without deducting some duplications, over four hundred individuals took part in the discussions. With twenty-five special conference meetings scheduled, as well as the general sessions, the program was one of great complexity and diversity (it would be futile to attempt to guess how many pages would have to be printed to form a "Congressional Record" of this four-day gathering).

As another index of the nature and extent of the Society's work it may be noted that during the past dozen years there have been conducted under its direction four comprehensive studies of general aspects of engineering education (two of engineering education at large, one of technical institutes, and one of graduate work); the Summer School for Engineering Teachers—a unique undertaking in this country—was organized and eleven sessions held; it is participating to an important extent, as a constituent member of Engineers' Council for Professional Development, in a nation-wide accrediting of engineering schools and in the other activities of that organization; and either through its general organization or its Divisions and Sections it undertakes and conducts other lines of constructive work too numerous to mention.

To summarize: From an organization whose activities, for a considerable proportion of its members, were confined chiefly to the brief period of the annual convention it has become one of year-round activity enlisting, to their unquestioned benefit, a significant proportion of the time and energy of a considerable proportion of its membership.

As another, and important, aspect of the general question to which these remarks are leading, it is to be noted that all of the activities of what has come to be a complex organization are managed by a very small (though experienced and highly efficient) headquarters staff of but two individuals: comprising a part-time Secretary and a full-time Assistant Secretary. This is in contrast to other organizations whose activities are scarcely more diversified than our own whose central office organizations comprise from twenty to fifty persons.

For the rest, the Society's general affairs are managed by its elected officers, constituting the Executive Committee which functions, with power over certain matters, between meetings of the Council, and the Council which acts both as a legislative body and also, in part, as an executive body. These latter—the officers and Council—as well as all the individual members who participate in one or another of the Society's undertakings, serve in purely voluntary capacities. It is a fair general characterization, therefore, to say that our organization as a whole is one of voluntary participation, operating under a very small staff organization, and with an income sufficient merely for its more elementary needs. The aim here is not to consider this form of organization critically; on the contrary, it is quite possible that if such an abundance of staff and of funds were available that voluntary contributions of time and effort, made at personal sacrifices of our members, became less necessary, the interests of the Society, and through it of engineering education, would suffer.

The purpose here is merely to provide a general foundation of fact upon which to base consideration of one of the problems that has arisen out of our recent developments: that of planning and coördinating the work of the Divisions and the Conference feature of the annual convention. Two rather distinct aspects of this general problem may be stated specifically as follows: (1) Whether, because of the nature of the Divisions and of the Conferences, the Society is likely to engage increasingly in matters of a technical nature such as to take it out of the realm of education and into that of professional engineering and science; and (2) how the diversified activities and interests of the Divisions and Conference groups may be coördinated so as to avoid undesirable overlapping and conflicts. It may not be inappropriate, though it is certainly done at some risk, for me to state my views as to certain principles which I consider applicable to the situation here outlined.

As to (1), above, the answer seems to be both simple and clear: Scientific and technological education is concerned with scientific and technological subject matters; they are, indeed, the substance of which such education is composed. This statement does not imply any attempt to answer the question as to whether subject matter or method is the more important in education for the professions; both are as essential to such education as are air and water to life. It seems clear that discussion of technical matters must to a considerable extent inevitably form the basis of the discussions of our technological and scientific divisions, such as those in civil engineering and physics. The clear distinction ought to be made, however, in considering our sphere of activity and influence in its relation to that of the technical and professional societies of engineers, that we are concerned with education in, and the educational aspects of, these technical and scientific matters: with the additions to the science and art of engineering that are and should be made by educators and educational institutions; with the organization of the ideas and the facts of the profession into subject matters of instruction; and with the means and methods of presenting these subject matters in such a way that students will be led to grasp their essential aspects. If this distinction be kept clearly in mind, regardless of whether, in every instance, educators or engineers in practice participate in our programs and our work, it would seem that we shall be keeping properly to our own avowed aim and purpose.

As to (2) above—*i.e.*, the direction and coördination of our undertakings—while the solution in practice can not be simple, the underlying principle seems to be equally clear. It has been stated above—and the purpose of the general summary of our activities and the nature of our organization now, it is hoped, becomes ap-

parent—that our Society is essentially one of voluntary participation which ought to include contributions of as large a proportion of those concerned with engineering education as possible. It is intended to serve the needs of engineering education at large, and it can best do so by aiding in the promotion of the interests of its individual members. This it can do best by providing means for their active participation in its affairs. This is unquestionably the greatest good that has come out of the recent growth of the "Conference Plan" of our annual meetings. To foster such a plan in any organization, and particularly in one such as ours, leadership and initiative must be capitalized wherever they appear or can be discovered. If this principle is to be applied, it is inevitable that something must be sacrificed in the aim of planning the work of our Divisions in accordance with a preconceived ideal plan of organization. Freedom to carry out activities according to the ideas and the wishes of individual groups must constitute a basic aim of the plan of operation. In proceeding in this way, it is clear, of course, that on some occasions the ideas and wishes of individual groups will come into conflict. It is here that a central agency or committee of the Society is required to do what it can to avoid such conflicts. In most cases this will be done simply by providing a clearing house or information so that the groups themselves will be led to plan in harmonious coördination. Occasionally the central committee will have to decide cases in the best interest of all concerned. The chief consideration is that this be done without impeding the initiative of those individuals who are willing to undertake leadership and to continue to guide and direct our undertakings even after the first enthusiasm and interest in them has abated. It was this purpose, or so I assume, that was the intent of the action of the Council in providing for the coming year a general committee under the chairmanship of a Vice-President to supervise and coördinate the preparation of the conference portion of the program for the next annual convention.

One of the principles in accordance with which the Society's general investigation of engineering education (of 1924–1929) was conducted was that it should be carried out by the schools and the teachers themselves as a self-study, with the coördinating aid of a central Board and Staff. The wisdom of this method, in such a group and in such an organization as ours, was amply demonstrated by the results of the investigation. It is proposed now to apply the same principle in the organization and prosecution of the work of the Divisions and the operation of the Conferences.

THE SPIRITUAL ADJUSTMENT OF THE ENGINEERING STUDENT *

By DOUGLAS S. ANDERSON,

President, Society for the Promotion of Engineering Education;
Acting President, Tulane University

Ralph Waldo Emerson once wrote, "The true test of civilization is not the census, nor the size of cities, nor crops—no, but the kind of man a country turns out." This might be paraphrased very closely to apply to our schools of engineering, in fact to the whole field of education, to read,—The true test of the effectiveness of engineering education is not the number of students registered, nor the size and magnificence of the buildings on the campus, nor the extent of our laboratory equipment and other facilities—no, but the kind of man the college turns out.

While it is well recognized that this introduction is simply one way of calling attention to the general problem which is ever before this Society, and that it also smacks somewhat of the obvious, still it is the speaker's intention in this opening address to discuss a phase of the general problem which perhaps has not been sufficiently emphasized, but which, in these times of unrest and readjustment in our whole social structure, is of the very gravest importance to our engineering graduates as we send them out each year, using an expression of President Williams, "to enjoy the high privilege of effective citizenship in a scientific civilization."

It will be recalled that President Walters upon the occasion of the banquet at the Atlanta meeting named as the three outstanding criteria of quality in the engineer, *expertness, personality* and *character*. He defined expertness as a combination of native ability, training and experience. While it is obviously the special function of the engineering school to furnish the means through which the prospective engineer is to acquire the second of these qualities, viz, training, it is also possible for the school to provide a reasonable degree of the third, viz, experience. While native ability represents a quality or a combination of qualities acquired by inheritance and fostered by environment and previous training, still it is incumbent upon the engineering school to adopt and to apply such effective methods of selective admission as to secure in its student body a large percentage of good native ability.

* Presidential Address delivered at the 44th Annual Meeting, S. P. E. E., University of Wisconsin, June 23–26, 1936.

It is certainly safe to say that in its fundamental characteristics the curriculum of the well organized engineering school of to-day amply meets the demand for effective training of the student in the quality of *expertness.* President Williams and others have called our attention to the need for new adjustments to meet our changing economic and social conditions, and while in the light of studies constantly being made by committees, divisions and sections of the Society for the Promotion of Engineering Education, there will be other adjustments as to details, the basic engineering curriculum will continue to provide effective training in expertness.

Is it a specific function of the engineering school to provide means by which the student may develop his personality and his character?

Can we "teach" personality and character?

Shall this phase of his training be made part of the curriculum or shall it be considered rather in the light of a by-product of his college course?

These, as well as numerous other similar questions, have been in the mind of your speaker for a long time, with the final result that at his suggestion the executive committee approved as the keynote of the annual meeting, which we are opening to-day, "The Spiritual Adjustment of the Student."

The term spiritual adjustment, as here used in its broader sense, is intended to refer to all of the influences which may be effective either objectively or subjectively in developing, in broadening, and in refining the student's qualities of mind and heart, as well as bringing to him an abiding sense of social responsibility; qualities which, it is recognized, may be already inherent in his nature to a greater or less degree, acquired by heredity and previous environment.

There are college teachers and administrative officers who believe that character, and even personality, are so completely matters of heredity, that the environment and influences of the college can have very little effect in changing or developing these inherited characteristics. On the other hand, perhaps the most insistent and the sharpest criticism of the product of our colleges is to the effect that many of our graduates, while well grounded in the technical requirements of their profession, are lacking in many of the simplest criteria of personality and sometimes leave much to be desired in the matter of dependable character, and these critics evidently believe that the colleges are not doing their full duty in their apparent failure to develop these highly desirable qualities in their students.

Whatever may be our individual personal reactions to either or to both of these points of view, we cannot deny that there has ever

been a time, certainly not within our own experience, when good manners, pleasing personality, common honesty and strength of character were more needed for the solution of the many problems of our complicated social structure than they are at the present time.

What then is the problem before us, teachers and administrators of our schools of engineering? While one may believe that a grave responsibility rests also upon the professional schools of medicine and law for guidance in the spiritual adjustment of their students, this responsibility is far greater for the average American school of engineering through the fact that in most instances its material comes to it directly from the secondary schools, and the college of engineering must, therefore, assume in part the responsibilities of the arts college in addition to those responsibilities which belong more peculiarly to the professional school. There is abundant evidence in the utterances and in the writings of professors and administrative officers of the colleges of arts and sciences throughout this whole country of an awakening interest in, and a growing sense of responsibility for, what has been termed the spiritual adjustment of the student. The student, himself, is assuming a critical attitude toward many of the conditions which he finds in his college to-day and he is demanding the kind of instruction, both as to content and to organization, which in his opinion will best fit him for the place he is destined to assume in our social structure. We find him also looking critically at present day standards and ideals of certain extra-curricular activities, which a few college generations ago were considered to be the concern solely of the student, himself, but which have now come either partially or totally under the control of the college administration. Grave doubts are being raised as to the real value of the college fraternity, and many thoughtful students look askance at the spirit of commercialism which, it is alleged, has crept into the field of intercollegiate athletics.

Due consideration must also be accorded the growing tendency on the part of American parents to delegate to the schools, both secondary and collegiate, their own responsibilities in the matter of character training for their children. This point needs no further elaboration here as it is a matter of record for the younger generation of educators and a matter of personal experience for some of us who have been in the educational field throughout the period covered by the life of this Society. And closely allied to this is the factor of the changing complexion of the college student from the point of view of his inherited qualities and his social environment. To express it somewhat differently, it is the belief of the speaker that the typical citizen of this country sends his son to school and to college with the expectation that these two agencies will offset the

sins of omission or even commission from which the student may have suffered in the previous development, or lack of development, of his personality and character through his home and other social environment.

While much has been written and published on the subject of character education, the greater part of it has applied to training in the elementary and secondary schools, where it has been clearly recognized that the necessity for this particular type of education arises to no small degree from the changing character of the American home, or from what has been characterized as "the passing of the old American home." To meet this as well as other challenges connected with the question of personality and character building, schools, public and private, have organized their curricula, and given closer attention to extra-curricular activities so that the child is being trained both by precept and example. When, therefore, the student registers in the engineering college after graduation from high school, he may be presumed to have already received a reasonably full dose of character training. There is at times a suspicion that some of this training is so detailed and formalized that it emphasizes the letter at the expense of the spirit. In a recent paper on this subject in *School and Society,* Professor Francis J. Brown notes that a precocious child, instructed in one of these highly organized courses, was the author of the following:

> "The first week, I am honest, sincere and most contrite,
> The second, well I just don't care, but pretend to be polite.
> The third week I am careful, no auto need we fear,
> While on the fourth I'm thrifty of stolen pennies dear."

This young person had evidently been quite definitely exposed to a course in character building in which the successive weeks were devoted, one each respectively, to the cultivation of certain suggested criteria for the development of character, such as honesty, sincerity, repentance for past sins, politeness, carefulness, and the eighth commandment. The breaking of the latter is apparently no sin in the mind of the child provided the virtue of thrift is applied to the unearned increment. This is not entirely inconsistent with ideas and ideals which are alleged to prevail in some of the more mature minds of our modern business and financial world. It is to be hoped that this particular type of character training may not be too greatly featured in the schools from which we draw our students of engineering.

That the college of engineering attracts to its courses many of the best and ablest of our high school graduates is borne out by our own personal experience and by investigation of the question. Even

so, it has been found that the scholastic preparation of many of these students is inadequate or ineffective and much must be done in the first year of college to offset these deficiencies. This Society, through its various committees, has conducted detailed and extensive investigations to determine, if possible, the causes for what we have called lack of proper preparation. May it not be true that much of this inadequacy of preparation comes from lack of character training of the proper sort, rather than from defects in the student's scholastic training? As evidence of this we may point to the development and growth of programs of orientation for the entering student, of the adoption by many colleges of the advisor or counselor system of handling the student's individual problems, and even of the proposal, and the actual adoption by a number of colleges, of the plan of having a psychiatrist or mental hygienist attached to the regular staff of instructors. The necessity for such an important official as the dean of men is in part a recognition of our responsibility for assisting the students, both new and upperclassmen, in the development of their personality and character. There are other offices and other activities on every campus which contribute to this much desired end, but which we may not always recognize definitely as such.

Perhaps the first question which arises most naturally to mind is that of the possibility or the practicability of introducing into the curriculum what might be termed courses in personality or character building. We are all teachers or administrators, or both, and much of our experience is so closely connected with the rather formal settings of the curriculum, that when criticism comes to us, as it inevitably does, of the ineffectiveness of the teaching and the training that we give our students, we begin to cast about us to see whether we may not add something to the curriculum to take care of the particular situation. If it should come actually to the question of adding definite courses in personality or character training, I should say no. As such there is too great a tendency for them to drift into preaching or into what the student might term "courses about morals." Far preferable would it be to have a teacher, himself possessed of the warming fire of personality and character, through the medium of one of the regular subjects in the curriculum so instill into the student a love of truth and a sense of responsibility to the particular task in hand that it cannot fail to be a significant influence toward the development of his character. It is of interest to note in this connection that at the next session of this meeting we are to have a paper which seems to illustrate this very thought, "The Drawing Department's Opportunities in Spiritual Adjustment" by Professor French.

There is one point at which the curriculum comes in for serious

consideration in connection with the spiritual adjustment of the student, and that is the very practical question of the possible overcrowding of the schedule, both as to number of courses and the exacting time requirements for some of them. It is no idle complaint, when it comes from some of the very best of our engineering students, and the feeling is shared by many of their instructors, that the long daily schedules of class and laboratory periods and the labor of report writing operate to preclude the student's participation to any extent in the desirable and worth-while activities and pleasures of campus life. This is particularly noticeable where the school of engineering is part of a large university and the opportunities of the engineering student for taking part in extra-curricular activities are contrasted with those of the student from the arts college. While it may be argued that good character is a natural result of trained intelligence and that the disciplines imposed by hard work and intense application are a necessary means to this end, on the other hand a too intensive application of this idea is apt to lead, in the case of the under-graduate student, to his becoming something of a mere "grind."

What are some of these activities? They are many and varied in modern college life, so many in fact and so varied, that there is ample opportunity for the student to find expression for his own individuality and to cultivate and develop his personality through means both pleasureable and profitable. To take just a simple example, I have seen a boy, taken in hand by an inspiring and skillful director of a glee club, and with very little of the atmosphere of formal teaching, made to realize that participation in group or choral singing was one of the most delightful ways of expressing his own individuality. This particular boy up to that time had failed to find himself in the life of the campus. Personal participation in the musical activities of the modern college affords a most valuable means of self-expression and development of personality.

Some of us who belong to an older generation of teachers view with regret the apparent passing of the old-time debating clubs or literary societies, as they were often called. Meeting once a week and conducted with a certain degree of parliamentary formality the young student was afforded a means and an opportunity for learning to "talk on his feet" and to maintain his side of an argument—both valuable factors in the development of his personality. It is true, in these days we teach public speaking and debating in the class-room, but this would appear to lack something of the spontaneity and absence of pedagogical restraint which prevailed in these old clubs. A modern trend in college life which appears to offset somewhat the passing of the old-time debating society is the appearance in the student body of an increasing interest in social and

political problems. If such interest can be wisely guided by teachers and faculty advisors, and not degenerate into the playing of politics in college, patterned upon some of our modern American systems, it should prove a factor of some value in the development of personality and character.

College publications, daily in some colleges, weekly, monthly and annual, offer a field of activity which should also prove of value as a medium for training in personality. In my own experience I have always found it a source of interest and pleasure to talk to the boys and girls who serve as reporters for the college weekly. A bit of time given to these interviews, and the interest and attention shown to the reporter, will often, I believe, help the student more than we realize.

Into the field of athletics I hesitate to enter. There are those who believe, and who assert, that not only the best teaching, but also the best character training in the whole college are found on the foot-ball field. At least one college president has made this assertion publicly. Another man, eminent in the councils of higher education, has asserted with equal emphasis, and also publicly, that in our educational system "team games, and particularly foot-ball, have come to exercise a distinctly demoralizing influence upon college life." That games and competitive sports should afford perhaps the most excellent medium on the campus for character training goes without saying. As an evidence of this one need only ask the average Englishman his opinion of the importance and value of competitive sports as a means of character building in the public schools and universities of England; the answer is too well-known to need repeating here. In our American schools the answer to the question of the character training value of athletic sports is one which must be left to each individual institution. My own feeling is that there is something of value to the student through participation in intercollegiate athletics, but the system of control with its intensely commercialized features renders this far less than it should normally be. There is hope that the increasing emphasis upon intra-mural sports may serve to bring back many of these lost values.

Of equal value to that of individual participation in the musical activities of the campus is the opportunity afforded the student to listen to good music in attractive and artistic settings, such for instance as a short vespers service with beautiful organ music in a chapel which itself has an appeal from the standpoint of beauty of architectural design or from the traditions of the past which have made it a place of hallowed memories. It is unfortunate that too often the chapel with its service is regarded as a place of boredom, or even mild torture, whose chief object in life seems to be that of

depriving us of that last quarter hour of precious morning sleep before the regular duties of the day begin.

There is, of course, the point of view, which has come down to us through many generations, that good character may be developed by required participation in religious exercises. It is a matter of grave doubt whether the modern college student subscribes with any enthusiasm to this idea. And yet it is an established fact that many students find an agreeable outlet for the expression of their individualities through the Y. M. C. A. and similar organizations. And there can be no doubt that a minister who has a message of real significance to the youth of to-day will always receive a generous hearing on the campuses of any of our institutions.

The dramatic club offers to the student who will take part in its activities just the right combination of fun and hard work as to make it a splendid medium for the cultivation of self-confidence, social adaptability, and the ability to express one's self, all of which are important phases of one's personality.

While the Greek letter fraternity is a secret organization selecting its members principally on the basis of social preferment, it would seem to offer, at least within its own circle, excellent opportunities for the older and more experienced senior members to influence and lead their younger brethren in the development of desirable personal qualities and attitudes. This supposedly highly selective method of admission of a small group of socially desirables appears in these days to be suffering somewhat from the same kind of infusion of mass production, which is so frequently alleged as one of the shortcomings of our modern college system of education.

That considerable attention has been devoted so far in this address to extra-curricular or student activities is evidence that in the opinion of the speaker they constitute one of the most valuable means of influencing the development of good personality and good character, if properly directed to that end. The words, "if properly directed," are used advisedly. Many in this audience will recall that, in their undergraduate days, student activities were strictly what the name implied, activities which were initiated, organized and controlled by the students themselves, without faculty intervention or direction. The picture is now completely changed. There is practically no student activity which does not have a faculty advisor or a faculty committee, or even an alumni committee, to act in the capacity of official mentor or guide. When such advisors or such committees are chosen on the basis fundamentally of their own outstanding qualities of personality and character, then we may feel assured that the activities in which they coöperate will become factors of the greatest significance in the spiritual adjustment of the student. By inference at least, if not definitely, brief

reference has been made to certain values which belong to the aesthetic side of life which may influence the personality and character of the student. One phase of this is the desirability of having the material environment in which the student works, and also in which he plays, measure up to the highest standards of architectural and artistic design consistent with comfort and convenience. Daily contact with material things of refined and artistic value must of necessity have a refining influence upon the student, himself. And the same general idea may be applied to the social contacts of his campus life, whether these be with his fellow students, with the members of the faculty, or with members of the families of teachers and administrative officers.

It is hoped that not too much attention in this address has been paid to factors in the development of personality and character which may be thought of as so self-evident as to appear almost trivial; in the mind of the speaker nothing is too small for due consideration as a possible means to the end of this spiritual adjustment.

And now in conclusion consideration must be given to what, as doubtless you are already thinking, is really the most important factor in this whole problem of the spiritual adjustment of the student. And that is the teacher, himself. None of these other factors will attain their full measure of effectiveness in the training in personality and in character building unless, and until, back of them all there stands a faculty made up of men who themselves possess that richness of personality and character which must furnish the concrete examples and illustrations of the precepts presented to the student as guidance for his own development. When one, after the lapse of years, looks back upon his own college days the memories that come pressing upon one most distinctly are not the particular things taught him by this professor, or by that one, but rather the high sense of duty which was reflected in their own actions, the high standards and high ideals by which they guided their own daily lives and their relations with the students, and their own generous personalities and fine characters.

If these things are true, and they are true, then it becomes the solemn responsibility of all of us whose duty it is to select and promote the teaching personnel of our colleges, to give due weight, along with intellectual and scientific attainments, to the personality and character of the men under consideration. The typical American school of engineering, notwithstanding its essential professional characteristics, has many of the attributes and features of the arts college and must, therefore, assume many of the same types of obligations toward its student body. Furthermore, the representatives of industry to whom we sell the bulk of our product are con-

stantly demanding that the graduates, who make up this product, shall be turned out with broader, richer and wiser personalities.

If the college is, as President Jessup characterizes it, "Life's one institution most whole-heartedly devoted to the development of the individual as a unit of society," then we shall fall short of our goal and our ideal if we fail to embrace every opportunity and to use every possible facility for the greater development and enrichment of those things of the spirit which are of significant influence in making of the student, a gentleman, using this term in its truest and most literal sense.

ADDRESS OF WELCOME

By F. E. TURNEAURE

Dean, College of Engineering, University of Wisconsin

Mr. President, Members of the Society, Ladies and Gentlemen: You were welcomed here twenty-six years ago. The attendance at that meeting was 151, of which about 30 were from the University of Wisconsin. To-day we are welcoming you, the Society, at a meeting where the attendance will be many hundreds. In 1910 we had a two and one-half day session and a few interesting papers were read. There were many strong members of the Society present at that time. They were just as earnest and just as successful engineering teachers as any we have now. Since those days a lot of water has gone over the dam. We have here a meeting of four full days and 25 conferences. We are really getting to be a 25-ring circus. At the Council meeting this morning the principal subject under discussion was how to handle this big circus. The road we have traveled since 1910 is indicated a bit by some of the titles of the conferences. We have Coöperative Engineering, Economics, Engineering Research, Graduate Study, Management, Manufacturing Processes, Orientation of Freshmen, besides special emphasis on Mathematics and English.

This Society does not stand still. The great change that has taken place in the organization and character of the program indicates that the members of the Society are awake to their problems. I am sure you agree that in this period of economic confusion and misunderstanding, the engineer has a very great responsibility. We the teachers are supposed to train him to think straight and to render honest and effective service in his profession. Our job is more important than ever before. I believe the members of this Society are aware of their responsibilities and this is well indicated by the programs at this convention. They are professionally more self-conscious. So the Society we are welcoming here to-day is a Society of wider interests than those of twenty-six years ago. The University is indeed highly honored by having the Society at this place at this time.

On behalf of the faculty I welcome you to the university, to the city of Madison, and to the State of Wisconsin; and I hope that these four days, extended perhaps to a longer period for recreation, will be very profitable, and that you will go back to your homes with a determination to do a better job in your work of preparing young men for the engineering profession.

ADDRESS

By GLENN FRANK

President of the University of Wisconsin

In the generation now ending, three forces of social modernism —science, technology, and power production—have enjoyed a vast prestige. To this trinity the modern West had tethered its hope for a progressively higher and more human quality of social existence. But their reputation as saviors has suffered a slump in the phase of disillusionment that depression brought to the Western peoples since the ending of the World War.

The current plight of the three is summarized in the current status of science in the public mind, for technology and power production are but the fruition and formal application of science to industrial enterprise. An examination of this status is important in any attempt realistically to assess the American outlook, for the relation of science to social management cannot but remain one of the major considerations of modern statesmanship.

The tables have been turned. For a good stretch of years, the scientists have been confronting society with the necessity of difficult readjustments in its procedures. Now society is confronting the scientists with the necessity of difficult readjustments in their procedures. The crisis in society has precipitated a crisis in science.

The physical sciences and the social sciences are alike confronted by a spreading skepticism of their effectiveness as agencies of change and control in modern society. The physical scientists are blamed for having caused the confusion and collapse that have fallen upon so much of Western life. The social scientists are blamed for having failed to prevent this dishevelment of affairs. That these reactions may be over-simplified and emotionalized is beside the point. The reportable fact is that the climate of opinion in which research must be administered has been radically changed since 1929.

This changed climate of opinion in which research must be administered reflects three shifts in the attitude of the public mind towards science: (1) a growing dissatisfaction with the fag ends of an era in which a *laissez faire* science has thrust into a *laissez faire* society a bewildering multitude of new facts and new forces that have produced extensive maladjustments and imposed severe strains upon the traditional structures and functions of the politi-

cal, social, and economic orders; (2) a growing disillusionment with a process of research in which the production of new knowledge has not been accompanied by a more effective effort to prevent its application from causing more troubles than it cures; and (3) a growing determination to have the political, social, and economic developments of the future better planned and better controlled.

It may be said that the dissatisfactions, disillusionments, and determinations reflected in this mood spring from an uncritical resentment against political, social, and economic blunders for which the scientists cannot justly be blamed. It may be said that the solo business of science is to produce new knowledge, and that to clutter its laboratories with considerations of the social implication of their output would but make science less efficient. It may be said that the current passion for planning over-estimates the capacity of the race to rule its bewilderingly varied and complex affairs with the foresight and fine attention to detail that less complex and more controllable enterprises permit.

But, whether it be well-founded or ill-founded, this new mood respecting research exists and must be reckoned with by all those concerned to enrich the service of science to society, as an engineer must reckon with the strains that will surely come upon the bridge he has been commissioned to construct. If the implications of these current attitudes towards research are not met, with promptitude and intelligence, it is not impossible that we shall witness a widespread revolt against science and a withering retrogression of the whole educational enterprise.

The prestige of the scientist and the productive utilization of his findings in the decade ahead will, in my judgment, depend upon whether research that is at all related to the broad problem of social management is planned, executed, and interpreted in the light of this triple-based mood which, however wrong in some of its assumptions, is right in its central aim.

This mood will condition the future and fortune of research for a good run of years to come. It is more than a transient whim. It is a mood that grows out of what is, perhaps, the most serious phenomenon of modern times, namely, the race between scientific progress and social instability. Researchers fired the gun that started this race. And those who pulled the trigger cannot wholly escape responsibility for the resultant casualties.

The development of scientific processes has moved with airplane speed. The development of social policies has lagged at a stagecoach rate. The physical sciences have produced social changes faster than the social sciences have perfected social controls. All sorts of maladjustments have occurred. The result has been this race between scientific progress and social instability, with insta-

bility, for the time being, in the lead. Many of the governments and business directorates of the time resemble nothing so much as a nervous spinster glaring with frightened eyes through the windshield of a motor gone wild.

A *laissez faire* science, functioning in a laissez faire society, has seen a ruinous social instability follow in the wake of rapid scientific progress. Down to fairly recent days, the mine-run of mankind did not connect the two. An uncritical enthusiasm for science mounted higher and higher despite the bombshells research was pitching into the midst of our traditional processes and policies. But, during the last five years, it has filtered down to growing millions, who may read no more than their daily newspaper, the Sunday supplement, and an occasional magazine, that the revolutionary results of physical science and industrial technology have brought our traditional order of life and enterprise to an historic turn in the road.

Millions of Americans, who have never heard of the social lag, are to-day sensitively aware that social control has not kept pace with social change induced by scientific research. This fact of social lag, which but a little while ago was an esoteric topic among the intelligentsia, is to-day wrestled with by the rank-and-filers in the smoking rooms of any train. The gravest threat in the offing is that this growing sense among the voting millions that scientific progress has got socially out of hand may lead to a ruinous relaxation of interest in and support of science unless ways and means can be found to modulate and humanize the impact of science upon society.

Research has moved countless millions out of the ancient shelters in which they had a decent measure of economic security, social stability, and spiritual peace, even if the life lived there was meager in content and convenience, and has left them unsheltered under the storm-swept skies of a strange world. In this strange new world, born of research, these millions have had a few more gadgets in bathroom and basement and there has been a transient lift in living standards, when the going has been good, but they find even these boons snatched suddenly from them in this current phase of economic insecurity, social instability, and spiritual confusion.

Any scientist who cannot see in all this a situation out of which might come a popular revolt against science and a social throttling of research by a political leadership responsive to crowd whims has lived too long in the subdued light of the cloister to see clearly in the broad daylight of human affairs. And any scientist who does not see in all this an imperative summons to modulate and humanize the impact of modern science upon modern society is something less than the society supporting him has the right to expect him to be.

I set it down, then, as a matter of critical importance to the future of research, in the physical sciences no less than in the social sciences, that scientists should come together in a conscious and common effort so to plan, prosecute, and publish their researches that the scientific progress of the next quarter century shall, as far as may be humanly possible, stabilize and enrich the life of state and nation instead of producing a further and, perhaps, fatal social instability.

This is, I admit, asking scientists to assume a new obligation. Traditionally, scientists, in social as well as in physical research, have been reluctant to assume responsibility beyond the production of new knowledge. They have tended to lift aloofness to the dignity of a virtue, assuming, when they have not asserted, that scientific objectivity is impossible apart from social neutrality. They have built their laboratories on the side-lines of the social turmoil and sound-proofed their libraries from the cries of the street.

This tradition of aloofness has here and there been broken by professors who have become suave brain trusters or swashbuckling campaigners. Such individual variants have not always been the best exemplars of science in the service of society. And this direct sort of participation in social management is not, let me make clear, what I have in mind in this plea for a reconsideration of research in terms of the current social situation.

I am not suggesting that the scientist desert his laboratory and run for office. I am not suggesting that the scholar be forever rushing into print with manifestos telling business men and politicians how to run their affairs. I am not suggesting that chemists, physicists, geologists, and like men of the laboratory relax the concentration of their energies upon their respective specialisms and squander their time on amateur excursions into political science and economics. I am not suggesting that the creatively anarchic individualism of the pure scientist be tampered with. To the end of time, he should be permitted to follow his own nose when it scents a new and inviting trail into the unknown. I am suggesting only that, aside from those fundamental researches dealing with matters obviously still far from the stage of social implication, research in general should be planned, executed, and interpreted with a living sense of its immediate and long-time impact upon the structure and functions of the society which conditions our lives and enterprises.

I realize that even this suggestion runs counter to two assumptions that have long prevailed in scientific circles. It has been assumed that the production of new knowledge is intrinsically and inevitably good, and that, if a new fact blights instead of blesses mankind, the blame must rest upon predatory business men,

blundering politicians, or ignorant individuals who have misapplied the fact, not upon the scientists who have made the fact available. And it has been further assumed that responsibility for considering the social impact of modern science upon modern society is a specialized responsibility resting exclusively upon the social scientists and is no business of the physical scientists.

I submit that events have conclusively shattered the first assumption, and that experience has proved the second assumption inadequate.

If we are concerned to maintain the continuity of modern science we cannot, in my judgment, longer hold to the aloof assumption that the production of new knowledge is automatically and always good. In the long reach of the centuries this assumption doubtless holds, but mankind, at least in phases of such complexity and stress as this, does not think in centuries. It thinks rather in terms of the next meal or the next election. Even statesmen have difficulty in remembering that the unborn are part of their constituency. It is this none-too-rarefied reaction of the crowd, whose votes in the end dictate the national budget and determine the national being, with which the scientists must finally reckon. For good or for ill, the next quarter century will, unless I am far afield in judgment, see an increasingly close social scrutiny of science by the crowd. And, if the prosecution of research continues to result in a greater and greater social instability, the crowd may drastically reduce its support of research and take steps to control the release and utilization of its results.

It may justifiably be said that any such popularly imposed embargo on the relentless exploration of the unknown would condemn American civilization to the black death of ignorance and result in a barrenness of life more destructive of the human spirit than the current instability. But civilizations have, before in history, taken steps quite as suicidal! Such a secession from the age of science is not impossible if the enterprise of research is kept too severely segregated from its social implications.

When some years ago the Bishop of Ripon seriously suggested a ten year moratorium on research to give society a digestive pause, a chance to establish effective social control of the new forces released by the research of the preceding decade, we could dismiss the suggestion as the nervous generalization of a cleric who might have had a bad night. We cannot so lightly dismiss the dangers hidden in the hysteria of a generation that has seen its civilization run amuck in the midst of its greatest scientific productivity.

The social scientists cannot, in my judgment, rightly be saddled with the sole responsibility for the wise human use of the results of the whole round of scientific research. I have, in fact, a haunt-

ing sense of unreality when I speak of the social sciences as a field apart from the physical sciences. As I run my eye over what the physical sciences have done to the lives of men, I am persuaded that physics, chemistry, and bacteriology are quite as social as sociology. There is danger in the distinction we have drawn between the social sciences and the physical sciences. A single responsibility has been split to the point where everybody's business has become nobody's business. Under the existing procedure of the sciences, society is not getting the benefit it might from either the social sciences or the physical sciences.

To date the researches of the physical scientists and the researches of the social scientists have been so segregate that the social scientists have had little more than the layman's knowledge of what the physical scientists were unearthing. And the physical scientists have been quite as insulated from the problems with which the social scientists were wrestling. The results of research in the physical sciences, as these results have been translated into action by the technologists, have been among the most important factors in producing the current phase of social instability, but the men who have produced these results in the first instance have, by and large, given little attention to their ultimate social impact. If their application wrought havoc, that was a problem to take sleep from the pillows of the social scientists! But, as research generally has been organized in these later years, the social scientists have entered the picture too late to do much about it, even if it were socially sound to hold them wholly responsible for the wise use of the results of research in the physical sciences.

It is imperative, I think, that our universities, research institutes, and industrial laboratories organize to insure an earlier consideration of the political, social, and economic effects of the discoveries of the physical scientist and industrial technologist. Under the research system to date, as I have indicated, the social scientists get into the game too late. They wait until the discoveries of the physical scientist and industrial technologist radically upset old social and economic arrangements and then come along as a kind of wrecking crew to clean up after the catastrophe and to suggest ways of preventing its recurrence. That has proved too costly a procedure. We must devise a method of continuous coöperation between the physical scientists and the social scientists in all our research centers. The social scientists must be kept informed of what the physical scientists are up to, not after the physical scientists have worked social and economic havoc with their discoveries but from the very beginning of their researches.

If the chemists or physicists are on the trail of a new idea in 1936 that may prove workable in 1956, the social scientists should know it in 1936, not in 1956. And, through all the twenty years between 1936 and 1956, the social scientists should be considering ways and means of making this new idea help instead of hamstring humanity if and when it becomes workable.

If we can invent such a method of sustained coöperation between the physical scientists and the social scientists, we can shorten by at least a decade the lag between the swiftly changing processes and the slowly changing policies of our national life.

ADDRESS

By His Excellency, PHILIP F. LaFOLLETTE

Governor of Wisconsin

Mr. President: As I looked over the audience tonight, I have been very much impressed with your cheerfulness, and I am delighted by it. In the last five or six years the engineering profession has been charged with the responsibility for the supposed evils of the machine age and all that has come out of modern engineering. I am glad that you have not been crushed by it, because I am one who very gravely doubts the justification of placing any such responsibility upon the shoulders of the engineer.

When you are thinking in terms of spiritual quality, either in the teacher or the student or in society, I wonder whether it is not the judgment of most of us, as we look back upon our own experiences and callings, that it is not so much what the teacher *teaches* as what the teacher *is* that conveys the overtone of spiritual quality. When I think of all of the charges that have been leveled against the engineering profession—its coldness and its want of appreciation of the social consequences of the machine, and then in contrast I see in my mind's eye a sweet, benign character that we all know and love here at Wisconsin, and know the contribution that he has made in his quiet way through a long and useful life,—when I compare a man like Dean Turneaure with the popular conception of the cold blooded engineer, I think that the engineering profession can feel that it has not been wanting in its share of spiritual qualities.

Each one of us owes a responsibility to the society in which we live somewhat in direct proportion to our ability to contribute to that society. I believe very deeply that the engineer has as great a contribution to make as anyone. I am not thinking now in terms of new inventions, although they are important, because, parenthetically, it seems to me absolutely futile to think in terms of trying to turn the hands of the clock backward. That cannot be done without smashing the machinery of our civilization. But the thing that I am thinking of particularly tonight is that the engineer, by the nature of his education and the nature of his training, knows, understands, and seeks to learn and obey the laws of science. If there is one thing that we need in this society of ours, it is that kind of thinking and that kind of action.

If one picks up a glass and drops it, no one doubts for a moment that the law of gravity is in operation. But if we attempt to apply the laws that are the inevitable consequences of machine production to our society, far too many of us are inclined to cry "bolshevism" or "reaction." Instead of thinking in clear, logical terms, our thinking is too apt to be warped by prejudice. If we are going to make this marvelous machine age of ours function, we must apply to the world of politics, the world of economics, and the world of social relations the language and the laws of the machine.

Unless I am very greatly mistaken, the essence of our social and economic problem is a mechanical one. We have learned how, in the past fifty or sixty years, to develop a tremendous amount of energy, and we must direct that energy into useful functions and purposes. If it is not given useful functions and purposes, it will find destructive uses and purposes. If any individual in American life understands that, it is the engineer. He understands the laws of energy and the necessity that the energy we have learned how to produce must find expression. He understands the futility of trying to bottle up energy—to put energy on the "dole," so to speak, with the idea that it will remain static. It will not remain static, and of course that is what we have been doing in America and in a good many parts of the world. Whether it is in intellectual, mechanical, economic or sociologic fields, we have not been able to find uses for this newly developed energy, or we have not been willing to find them. So we have tried to keep energy on the dole. Whether it is a dole for human beings, because unemployed people are formed of unused energy, whether it is hiring land to stay out of production, or a factory running at 50 per cent of its capacity—all of these are forms of not using energy.

I wonder if our problem cannot be illustrated in a rather crude way by a comparison with the furnace in the basement of this building. The firebox and boiler have been built in a proper relationship to each other. If one were suddenly to multiply the production of energy, the heat units, in that firebox fifty times, any novice would know that we would have to do something to the boiler or the boiler would do something to the building. It is not a question of politics, of republicanism or socialism, bolshevism, or democracy; it is a question of fact. That is the problem that we *all* must face in America, not just engineers or lawyers or doctors. It is a problem that we must face as Americans. If we have learned anything in the past ten years, it has been the inevitable consequences, the tragic consequences, of failing to use the energy we have liberated. If you go to Europe and see what has happened over there when that unused energy finds a destructive ex-

pression, I believe you will agree that it teaches us all that there are no private cyclone cellars, that no one in any country can go unscathed and unaffected by the consequences of these great upheavals. Everyone is affected by it. If what happens is for the better, we will all fare better; and if it is for the worse, we will all fare worse.

Ladies and gentlemen, it is inevitable that we recognize that we have this problem to deal with, and that in order to deal with it we must deal with it as a society, we must deal with it in cooperation with one another. We cannot deal with this tremendous problem as pure individuals. No matter how large a great corporation may be, no matter how great one human individual may be, the problem is too immense to be tackled alone. We must deal with these problems together. But by the same token, may I take the liberty of suggesting that it is not a question of whether we wish to deal with these problems together. The real question is: How are we going to deal with them together? It is inevitable that they are going to be dealt wth as a soiciety, but the way that we deal with them will determine whether or not we preserve what most of us mean by the words "American liberty."

I should like to take a concrete page out of our own history in Wisconsin as suggestive of the way some of us feel this problem has to be met. In 1931 Wisconsin enacted a law, the first of its kind in America, providing for unemployment insurance. By enacting this law Wisconsin acknowledged that the problem of unemployment is no longer a problem of just the individual, but had become the problem of all of us, and therefore all of us, speaking through our government, would act upon it. But in setting up the machinery, to deal with that problem, we believed it essential that we should encourage individual initiative rather than destroy it. Thus, in Wisconsin's Unemployment Compensation Act each employer's account is dealt with separately and each employer's contribution is kept separately, in order that the employer who runs his business efficiently is not penalized for the mistakes of the employer who is inefficient or unwilling to stabilize employment in his own plant. That may seem like a very simple point. To us it seems vital and essential. The thing that made America, as we look back upon her past, was not that we reached up and pulled other people down, but rather that we in America always set our machinery, always set our social and political and economic force in operation to assure everyone a full chance to rise.

Not as engineers but as one American to another, I take the liberty of suggesting that it is essential, if we are going to preserve the kind of nation that you and I want, that we should face fearlessly the proposition that we cannot operate our machinery, our

productive equipment, at 40, 50, 60, or 70 per cent of capacity. Machinery must be operated at the speed for which it was designed, and just as that applies to a single machine or to one factory, it also applies to the whole nation. We must run the total equipment of America at the capacity for which it was designed to operate if we want to operate our total machine in the black instead of in the red. In order to do that, it is inevitable that, in certain important respects, we act together. We cannot act singly. It is equally important that in what we do as a society, to improve our economic life we should think also in terms of the character and mind and spirit of human beings.

If we follow that general type of program, we can arrive at two basic propositions to insure the continued welfare of our nation, namely:

First, that there should be assured to every man, woman and child who is able-bodied a real opportunity to develop their gifts, and for every able-bodied man and woman a real chance to earn their livelihood from useful and productive enterprise.

Second, I am convinced that the most essential and fundamental thing we face, not only in economic terms but in spiritual terms, is that we must turn our backs on this idea of the handout, turn our backs on this idea of getting something for nothing.

But we cannot get away from idleness, poverty and relief until we adopt a sound alternative; and the alternative, as I see it, must be that we in America will make whatever changes may be necessary in order to assure every able-bodied person a chance to earn his living from useful work. Having done that, then anyone who does not choose to avail himself of the opportunity to work, to speak in the vernacular, will have a complete opportunity to "paddle his own canoe."

Wisconsin is proud to have this distinguished gathering of scholars and teachers here in our state. I speak not only for the state but for the university and our engineering school. May I add, as I leave you, this one word: I know that there is not any man in Wisconsin who is prouder to have you here than our dean. May I tell you that there are few people who are more deeply honored or closer to the affections, not only of the students and their friends, but the citizens of Wisconsin than this great old man who has given of his life, his energy and his vitality to helping men become useful citizens, men with a wide and generous outlook on life. If you are looking for spiritual adjustment, I should say that the Wisconsin answer is Dean Turneaure.

INSTRUCTION ON PROFESSIONAL LIFE AND CONDUCT

By DANIEL W. MEAD

President, American Society of Civil Engineers; Professor Emeritus of Hydraulic and Sanitary Engineering, University of Wisconsin

The speaker is greatly pleased that this Society is to consider at this meeting the spiritual in connection with engineering education. The time is particularly appropriate, for there has been no time in the last sixty years when the spirit of discouragement and defeatism has been more prevalent among engineering students, and perhaps among most of the younger and many of the older generation of engineers.

While this spirit has been engendered largely by the depression and the resulting scarcity of opportunities for professional work it has been augmented largely by the doctrine advanced by the President of the United States that "You can cheapen the cost of industrial production by . . . the development of new machinery and new technique and by increasing employes' efficiency. . . . But do not dodge the fact that this means fewer men employed and more men unemployed."

This untenable theory attacks the very foundation of the entire engineering profession which is based upon the fact that improved methods of manufacturing, transportation and production, and new discoveries and inventions not only cheapen prices but increase empolyment and add to the comfort, happiness and prosperity of all our citizens. This fundamental theory is demonstrated by the occurrences of the period from 1870 to 1930 during which the greatest development in this country took place. During these sixty years the population increased 218 per cent while the increased number of those gainfully employed increased 291 per cent, and there was a large decrease in child labor and a still greater increase in school attendance.

Any theory that implies that the work of the engineer is largely completed and that the future holds little in store for the professions is a mistaken pessimistic theory based upon the unfortunate events of the present depression, and implies little consideration of the lessons of the past. Such a theory has no economic basis. The progress of this nation and of the engineering profession is only temporarily delayed by this depression. This is not the end of progress and improvement. Individual initiative is not a thing of the past. The nation will soon reassert itself and again become

sane; and there will be greater advancement in future engineering achievement than there has ever been in the past. Advancement, improvements, inventions and discoveries will obtain within the next fifty years that will be beyond even the dreams of the present. The theory of scarcity will be abandoned and the theory of plenty established. Economical advancement and the adjustment of distribution by a fairer exchange of effort will occur which will make this a nation with a better distribution of opportunities and a more abundant life. And this advancement will be led by the men who are not disheartened by the occurrence of this depression, severe as it is, but who have broad enough vision to recognize the events of the present do not mean an entire change in all our social relations.

In a few years we shall look back on this present time with regret and shame for the limited intelligence which has been displayed in meeting the present emergencies.

For more than fifty years the speaker has been closely identified with public and private engineering work. During his twenty-eight years with the University of Wisconsin, his professional work —through an arrangement with the University—continued and was perhaps during that period of wider range and of greater importance than during the earlier years of his practice. In his contacts during these fifty years, partially in connection with his own work but perhaps more commonly in connection with other works in which he has not been directly interested, he has seen many irregular and unethical events which have varied from minor infractions of good professional conduct to rank dishonesty. Some of these were simply abortive attempts easily frustrated; some were carried out and exposed by investigations or court action; and some of them could not be exposed although the facts were sufficiently well known to satisfy all but a court of law. Such events are only too common in connection with almost every line of engineering activity which includes promotion, financing and construction of engineering works, public or private.

In reports made as a basis for promoting and financing engineering there is often a temptation on the part of the interested parties to try to secure reports that are favorable to their interests —reports that overvalue the good and that undervalue the objectional. The speaker has had occasion in a number of cases to assure his clients that while his services were for sale, his opinions were not; but it is known that such influences are not always so easily and so successfully met. In projects in which materials and machinery are to be furnished and construction is to be carried out, there is often opportunity for favoritism and unfair practice. Manufacturers' goods and machines may be accepted with-

out due regard for price on a basis of superior quality, real or imaginary. Specifications may be changed or new specifications substituted on the basis of equivalents or betterments in results, which may be fair and equitable or may be greatly to the advantage of the contractor or builder.

In his many years of contact with engineering work the speaker has realized how much is dependent upon the honesty and integrity of the engineer. The speaker is aware that such conditions are not everywhere prevalent. Those who are engaged in educational work, those who are in purely technical positions—either private or public—and all of those whose services do not include the purchase of supplies or machinery or the letting or execution of contracts may have little or no knowledge of the dishonest practices that assail their fellows in other lines of engineering work. The speaker believes that this lack of experience with the seamy side of professional life is the reason that instruction on professional life and conduct is not universally taught in the engineering schools of the country.

In 1916 Professor C. R. Mann, as the result of an investigation financed by the Carnegie Foundation for the Advancement of Teaching, reported that from correspondence with over 5,000 engineers whose opinions were sought as to the qualifications necessary for success for engineers, a weight of only 25 per cent was given for technical ability, *i.e.*, knowledge of fundamentals and technique of practice, while human attributes, *i.e.*, character, judgment, efficiency, and understanding of men, was weighted as 75 per cent.

During the 20 years that have since elapsed, a few colleges and universities have introduced into their curricula lectures on the subject of professional life and conduct, a knowledge of which is evidently greatly needed if the Mann analysis is correct, as most engineers believe it to be.

The reaction from students taking such courses is very favorable, and graduate students speak favorably concerning their own reactions and benefits from such instruction. Many thinking students who are not receiving instruction of this character feel that they need information aside from purely technical instruction furnished.

At the Birmingham meeting of the Student Chapters of the American Society of Civil Engineers, one of the student delegates said:

"We get a great deal of technical learning. Of course engineers must have that to succeed but along with that we need some training in citizenship. The schools train us to meet technical problems but we seldom learn in college just what part we are to play as engineers and as

men in the life of the community. Let some one tell us what we can do to become better citizens as well as better engineers."

In the last several months the speaker has had the opportunity to visit various local sections and student chapters of the American Society of Civil Engineers including several conventions in which a number of sections and chapters were represented. Altogether he has had the privilege of talking to student representatives from more than thirty universities and colleges. His talks have been along the lines of ethics and higher ideals and the desirability of reaching the students who are studying engineering and the younger engineer already starting in practice. He has been greatly pleased with the interest displayed by the young men who have been present. After several of these meetings, most of the young men have remained to ask questions, which has shown the interest they feel in these matters as well as their ignorance concerning most of them. What ideals should a young engineer endeavor to attain? What code of ethics should he attempt to follow? What is a code of engineering ethics? Some of these young men seem never to have heard such matters discussed before, and these were men who were either to graduate this June or next June at the furthest. It seemed pitiful that these young men who are to enter the profession so soon and under such unfortunate conditions could not have had better opportunities for instruction in this important matter.

It seems to the speaker almost a crime that any students in our universities and colleges (for he would not confine such instruction solely to engineering students) should leave their alma maters without some advice as to their duties and conduct as citizens and professional men, and some warning as to the influence and temptations which may tend to induce them into unethical and unprofessional actions. No student should leave his college without the assurance from some one, in whom he has confidence, that the best men and, in the best sense, the most successful men in every line of human endeavor are men of high ideals who will stand for what is right regardless of personal consequences.

In the university and college the student is largely surrounded by friends. The Faculty is there to inspire, instruct, and advise; and almost everything is done for the student's personal and professional improvement and benefit. The student during his course will encounter some selfishness, unfairness, jealousies, and even some dishonesty among his associates but in the main there is comparatively little of the rough and seamy side of life that is brought to his attention. As he leaves his college the conditions are radically changed. He needs a job and he finds many others in the

same condition, many of whom are willing to compete unfairly and to use almost any means to secure a coveted position. The influence of family and friends is often unjustly and unfairly used to secure undeserved promotion and advancement and, in unfortunate times, positions are hard to obtain and may sometimes involve in their acceptance requirements which are detrimental to the ideals of the college man. In sales positions, duplicity, misrepresentation and even dishonesty are sometimes required by employers who feel that only by such means can their products be placed on the market. The young man may be employed by engineering firms operated on a low moral plane and find that low ideals are prevalent and that honor is subordinated to profit, and conclude that if he is to be an engineer he must do as engineers do and not be too particular in his adherence either to truth or honesty.

These undesirable conclusions are hardly to be wondered at in this day and age when many of the great nations of the world have repudiated their solemn agreements and obligations, and when our own Country has unjustly repudiated its solemn covenant to pay its bonds in gold, has arbitrarily raised the price of gold, and has levied on the gold of its citizens, thus unjustly acquiring a dishonest profit of billions of dollars; when pre-election promises are regarded only as a means to secure votes and not as an honest contract with the citizens of the nation to be carried out on the same basis as any other honorable agreement.

The engineering schools of this country owe a duty to these young men to see that they appreciate the necessity of high attainments, and that they are informed concerning both the privileges and the duties of their great profession. At the present time many of the students are leaving their alma maters without information, other than technical, as to their duties as citizens and as professional men. Many of them, due to their ignorance of professional ideals, are morally injured and sometimes morally ruined by unfortunate associations or unfortunate employment. Some of them accept sales positions which involve commercial bribery often of a criminal nature. Others in their ignorance are led to accept favors and even bribes by contractors and builders to overlook contract requirements in cases under their supervision. The temptation to accept positions or to neglect duties or to do unethical things for immediate benefits often come to the engineer, young and old, in manifold ways throughout his professional life. If he can pass through his years of early practice without yielding to the temptation of subordinating his honesty and integrity to an apparent immediate profit, there is little danger of his yielding to such influences in this later life. Most observing men soon learn

that true contentment, happiness and success depend largely on self respect, honesty, and integrity, and recognize, with Goethe the German philosopher, that the successful life depends upon:

"Health enough to make work a pleasure. Wealth enough to support your needs. Strength to battle with difficulties and overcome them. Grace enough to confess your sins and forsake them. Patience enough to toil until some good is accomplished. Charity enough to see some good in your neighbor. Love enough to move you to be useful and helpful to others. Faith enough to make real the things of God. Hope enough to remove all anxious fears concerning the future."

Members of the Society for the Promotion of Engineering Education, can we not do something for the future improvement of the ideals of our great profession of engineering? Will you not aid this movement by giving the engineering students of this Country the best possible knowledge of the trials and temptations that may beset them in their early engineering practice; by encouraging high ideals, dependability, and honor in their lives, as citizens and in their professional work; by urging them to be honest in all their actions; by encouraging them ever to stand for a square deal in all their social and professional activities, so that these students may become good citizens and may each become an honor to his Country, his college, and his profession.

MATURING THE ENGINEER

By R. I. REES

Assistant Vice-President, American Tel. & Tel. Co.

With the usual reticence of the layman, I find it difficult to express my thoughts on the subject of the spiritual adjustment of the engineering student. Our own spiritual life is so deeply imbedded within us, and if I may say it, so sacred, that it is almost impossible to give it oral expression. Therefore, I shall attempt, out of my observation and experience, to give consideration only to some practical phases of this problem.

In my recent reading I ran across an interesting bit of statistical information taken from McKown * which may have some bearing on the discussion before us to-day. He says:

"The secularization of American education is strikingly shown in Parkin's investigation of the moral and religious content of 1,291 American school readers, covering the period 1776 to 1920. Here is what he discovered:

1776 to 1786.....	100% moral and religious emphasis
1786 to 1825.....	50% moral and religious emphasis
1825 to 1880.....	21% moral and religious emphasis
1916 to 1920.....	5% moral and religious emphasis."

Could it have been this moral and religious influence which gave spiritual fire to our pioneer forefathers, supplying the enthusiasm, energy and indomitable courage necessary to turn a wilderness into a great empire? Could our impotence and confusion in dealing with present day social problems be due to our having lost our spiritual moorings? I shall leave this thought, since I promised to be practical. My contribution comes mainly from two recent experiences.

It was my privilege and pleasant duty to serve as a delegate from this Society to the annual meeting of the American Council on Education. Many, if not all of you, will eventually read in *The Educational Record* the reports and addresses delivered upon that occasion. That meeting also had a keynote, which was sounded by President Zook when he reviewed forty years of progress in making education a scientifically controlled enterprise. He outlined the contributions being made under the direction of the Council, and pointed to the evidence of rapid advance in the use of

* H. C. McKown, "Character Education," McGraw-Hill, 1935.

the results of research and scientific procedures in education. Dr. Lotus D. Coffman, President of the University of Minnesota, in his annual address as Chairman of the Council, was no less emphatic in support of the corollary that educational experimentation, to be dependable or even respectable, must be scientific in its procedures and especially in its techniques of evaluation.

As your representative, it was appropriate for me to consider the special bearing of these two addresses and others upon the work of the Society for the Promotion of Engineering Education and of our engineering colleges. As I listened to the papers at that meeting, it seemed to me that these scientific procedures in the field of engineering education included control of the following aspects:

1. Specifications for graduates of the engineering school.
2. Equally strong specifications for candidates for admission.
3. A scientifically designed curriculum in the engineering school to guide the student who meets the admission specifications without loss of time or ineffective effort toward achievement of the graduation specifications.
4. Most certainly an evaluation procedure by which we may know what we are about at every step of the operations.

There is no doubt that the first and third of these items have already been dealt with competently by the engineering educators, the latter particularly in the field of professional development. I think we also realize, out of our experiences, that specifications for candidates for admission, and evaluation procedures can still be much improved. Referring, however, to specifications for an engineer, I was interested in a paper presented at the Council meeting by Mrs. Marie Butts, the Executive Secretary of The International Bureau of Education in Geneva, reporting innovations in Europe and other countries. Far from suggesting that we imitate the shifts that have taken place in any autocratically controlled country, action there supplies a warning to see that our own house is in good order. As you read Mrs. Butts' paper, I am sure you will be impressed with the strength of the European movement to intensify physical education through games, military training, a compulsory year of farm labor, and other devices. Schools under the control of dictators are reported to be attempting to make sure that the man-power of the nation is physically fit for the work in hand, whether military or productive. You will be impressed, but not surprised at the loss of prestige of the individual European student who has only scholarship to recommend him.

These European policies raise the question as to whether we should not study our own situation, but there are still more im-

pelling reasons for doing so which must impress us when we reflect upon current conditions at home. For example, are we not all agreed that the specifications with which we attempt to define our objectives in the field of individual character have been vague, indefinite, and very unsatisfactory? An important reference on this subject was made by Dr. Mann * in his engineering report. There it was shown that several thousand employers made it a practice to give upwards of a 75 per cent weighting to those characteristics which fall broadly within the term "character" and only 25 per cent to the combined techniques and skills of the engineer. The Wickenden investigation certainly supported this view of the importance of developing high character. It is probable too, that employment practice has moved, during the last twenty years, in the direction of ever closer scrutiny of the character qualifications of the prospective employee. At least, the policy and practice of the American Telephone and Telegraph Company have moved in that direction during the years of my association with it.

Again, in reading the annual report of one of our well-known engineering colleges, I observe that the President † said: "Despite general unemployment, there is and always has been an urgent call for men of exceptional qualifications of *character* and training. With all the money which is being spent on education, it has seemed unbelievable, but it is true, that we simply do not know where to turn to find men whom we can unhesitatingly recommend for positions which are brought to our attention daily. This fact I consider to be the most important indication as to the direction which our major efforts should take."

Looking at the same question from another direction, engineers have been spending a great deal of time in discussing a negative aspect of the same question, namely, the licensing of engineers. The main purpose of such a practice is to protect society against those who would, because of fraudulent intent or ignorance, construct and install equipment which is in any way hazardous to the public. We must see to it that only men of high character and technical competency shall practice engineering. Yet it seems to me that the proposals so far presented contain no adequate, scientific procedure to check the worthiness of candidates for positions of public trust.

While in Europe autocratically governed countries are acting upon the conviction that the physical fitness of their youth is of

* Dr. C. R. Mann, "A Study of Engineering Education," Bulletin 11, Carnegie Foundation for the Advancement of Teaching, 1918, pages 106–113.

† President K. T. Compton, Massachusetts Institute of Technology Annual Report, October 9, 1935.

primary importance, upon what conviction ought we in America to be acting? The question that torments me is: Do we really believe that character is the most important asset in American youth? If so, do our program and practice in education reflect the intensity of our convictions regarding the importance of character training? If the engineering profession is dissatisfied with its record on this point there is, of course, this mitigating circumstance: that our techniques of character-building and our techniques of evaluation in this field are still at too elementary a stage to furnish a satisfactory means of administrative control, and consequently, efforts to achieve desired character values in education in a degree comparable to our achievement in scholarship or mastery of scientific subject matter must be somewhat uncertain.

The character item does not stand alone as a somewhat neglected one. There has been much uncertainty about the so-called cultural areas in the educational program for the young engineer which, if well conceived, should contribute to character development. We have lacked specifications for the culture of an engineer which are sufficiently definite to provide a basis for curriculum design and for evaluation of results in the cultural area; and the realization is being borne in upon us that we sadly need research and experimentation as a background for dependable specifications. Some engineering schools are attempting this experimental approach.

Perhaps it would be fair to say that to a substantial degree the engineering schools have applied specifications for curriculum design and scientific evaluation to only those sections of the specifications for an engineer which have to do with his technical competency. We have continued to devote our full effort to achieving definite results in subject matter fields, waiting for someone else to evolve the procedures and techniques with which to do a better job in the areas of physical and mental health, character, and culture.

In the research program of the American Council, it has come to be recognized that the problems of mental hygiene are at least as important as those of physical hygiene, and that controlling and guiding the emotions of the individual is at least of equal importance to the task of maturing his intelligence. The Committee on Emotions of the Council is about to publish its review of the literature and its proposal for further research. This publication alone promises to have a profound influence upon our scientific techniques of education.

New tools and instruments for measurement of cultural progress and mental ability are rapidly being developed and are gaining in use. Dr. L. L. Thurstone of the University of Chicago reported

success in breaking down what we have previously described and measured as general intelligence, into differential and measureable traits, such as Number Facility, Word Fluency, Visualizing Ability, Memory, Perceptual Speed, Induction, and Verbal Reasoning. As these researches bear fruit, there is a promise that there will come to the engineering college, along with the engineering candidate, a continuous record card upon which will appear a reliable indication of the pattern of his native intelligence and emotional make-up, which will enable engineering teachers to know much more about the inherent traits of the human material with which they are dealing.

At Columbia University, Dr. Ben Wood has, for many years, been a leader in the development of cumulative record cards and is a proponent of the continuous record of items of behavior, which is a qualitative, scientific device known as the Anecdotal Behavior Journal. The experimental establishment of such a journal occurred at the Rochester Athenæum and Mechanics Institute in 1931, and has been, since then, under continuous development there. More recently, it has been made a prominent part of the experimental procedure among the thirty preparatory schools involved in the so-called eight-year experiment of the Progressive Education Association.

Here we have the development of a scientific technique in its early qualitative phase, but one which promises to affect profoundly the personnel practices of all those institutions which undertake to concern themselves with maturing character or with the whole pattern of specifications essential to an engineer.

My second recent experience concerns a visit to Rochester Athenæum and Mechanics Institute. This school, as you all know, is a non degree-granting institution, with an engineering curriculum of the coöperative type. There are other curricula, amongst which is the School of Fine Arts which is using superior techniques and procedures which for lack of time I can not here describe.

President Randall, with the assistance of Professors Charters and Tyler of Ohio State University, has put into practice all the foregoing techniques which have resulted from painstaking research. On the basis of a complete case history of the candidate for admission, including home, church, education, occupation, and all other environmental influences, an activity analysis is made which develops the educational and training needs of the individual. On the basis of this study an individualized curriculum is determined upon. Diagnostic tests are given, and achievement tests made to measure and evaluate progress.

It was evident that in the application of all these techniques there resulted great improvement in determining specifications for

admission, curriculum design, and graduation. This institution, not granting degrees, can carry on and evaluate experimental work with greater freedom and facility than degree-granting institutions. Since Rochester Athenæum is training engineering students who are coöperatively employed, and since it is experimenting in all of these fields, I found it a source of great satisfaction to observe at first hand the direction which these experiments are taking. The methods of instruction experimentally selected and validated are applied with a philosophical background growing out of the conviction that education is *self*-education, and that skill in self-direction is an important character outcome.

As a tool which is being used most effectively in the development of character, it seems to me the Anecodotal Behavior Journal already referred to has outstanding value. No doubt, many of you are familiar with this procedure and it would certainly take too long to describe it here. The essential nature of the anecdotal method of personal analysis consists of at least four important procedures which must be carefully distinguished: observing conduct, recording observations, periodic analysis and interpretation of anecdotes, and last, and perhaps most important in its relationship to character development, is remedial treatment.

As I pored over the folders of numbers of students at Rochester, there was no doubt in my mind that this anecdotal analysis of conduct contributed to strengthening the student in all of his fields of endeavor, and particularly to the development of good character. Confirming the values of this scientific approach was the enthusiasm of the teachers for its use in developing closer relationships with their students. One of the best descriptions that I have found of this anecdotal method of approach appears in a paper by Professor Ben Wood, entitled "The Major Strategy of Guidance," published in the *Educational Record* for October 1934.

There seems no need for us to enter into a discussion as to whether character education can be taught directly, or whether it can be achieved by indirect methods. The development of character is a problem peculiar to the individual student, and teachers can only influence that development through sincere, sympathetic counsel with the student, in the endeavor to aid him in improving his conduct and encourage his spiritual growth. This undertaking truly lies within the field of individualized education. In order to counsel wisely, the teacher needs all the tools which have been described here, so that his knowledge of the individual may be comprehensive and fundamentally sound. This is a real engineering attitude toward the problem of character development. Our own committee, working in this field, should be strengthened and encouraged.

As we enter these new fields, our responsibilities broaden and deepen. In fulfilling these obligations, it would be a cause of intense satisfaction to us if, upon graduation, the student could face his life's career:

Mature in the fundamental character of his present knowledge,
Mature in the development of intellectual power,
Mature in his sense of social responsibility,
Mature in his acceptance of moral values, and
Secure in the foundation of his spiritual life.

This is the vital problem of the guidance of youth. In meeting the demand which President Anderson has placed upon us for the spiritual adjustment of the engineering student, we shall discharge a sacred trust.

MINUTES OF COUNCIL MEETINGS

Present: D. S. Anderson, P. H. Daggett, W. O. Wiley, F. L. Bishop, F. E. Ayer, J. B. Finnegan, B. R. VanLeer, C. H. Willis, G. P. Boomsliter, G. W. Case, C. E. Davies, C. L. Eckel, P. T. Norton, W. T. Ryan, J. W. Barker, M. M. Boring, A. B. Domonoske, L. E. Grinter, F. L. Plummer, D. C. Jackson, F. E. Turneaure, A. N. Talbot, A. M. Greene, C. F. Scott, A. A. Potter, O. M. Leland, R. L. Sackett, R. I. Rees, H. S. Evans, R. A. Seaton, C. C. Williams.

The report of the treasurer, W. O. Wiley, was read and accepted. The treasurer, at the suggestion of the auditor, was authorized to write off $900.00 owed to the Society by the Lamme medal fund.

The report of the secretary, F. L. Bishop, was read and accepted. In this report the secretary recommended that 10 per cent discount be allowed to those individual members who pay their 1936–37 dues on or before January 15, 1937. This was approved by the Council.

H. P. Hammond, Chairman of the Committee on Graduate Study, reported that the final document is now in the hands of the printing office in Washington, D. C., and will be available some time this summer. Upon motion this committee is continued until the report is out and will then be discharged.

Professor Hammond also reported on the Summer School on Economics to be held immediately following this annual meeting at the Stevens Institute of Technology summer camp.

As one of the representatives of this Society on the Engineers' Council for Professional Development, Professor Hammond made the following report on the accrediting of engineering colleges:

"During the year the work of the Committee has been devoted entirely to the program of accrediting of undergraduate curricula of degree-conferring engineering schools. Thus far the program of inspection has been confined to two of the seven regions into which the country has been divided: Region I, the New England States; and Region II, the Middle States and Maryland. It was in these two regions that E. C. P. D. was authorized by its constituent societies to launch its accrediting program on a trial basis before inaugurating it in other sections of the country.

"The program was launched in June, 1935, by letter of notification advising the degree-conferring institutions in the two regions that E. C. P. D. was prepared, upon invitation, to appraise undergraduate curricula with a view to accrediting. The basis of evaluation and the principles upon which lists of accredited curricula would be prepared, as well as the procedures to be followed in visiting and inspecting the institutions, have been reported to the Society previously at the Atlanta meeting.

"The first stage of the accrediting program has now been virtually completed so far as the visits of inspection and evaluation of statistical information is concerned in Regions I and II. Forty institutions in these regions have applied for consideration of their undergraduate curricula and all but one of which have now been visited, that one having submitted its application so late that the visit has been postponed to next autumn. All but four of the degree-conferring schools of these regions are included in the forty. Of the remaining four, two are in New England and two in the Middle States and Maryland. One of these does not offer undergraduate curricula and hence does not fall within the scope of the program; one offers a single curriculum in a special field; and one, it is understood, is merely deferring action.

"The first visits of inspection were made in November, 1935, by the full membership of the Committee on Engineering Schools. Early in 1936 the two regional committees were organized and began their work. The last visits were made in May and complete reports on all schools and curricula have now been prepared. The membership of the two Committees is as follows:

REGION I, NEW ENGLAND

"Representing the Society for the Promotion of Engineering Education: D. C. Jackson,* R. E. Doherty, G. W. Case.

"Representing the American Society of Civil Engineers: G. W. Case and C. W. Sherman.

"Representing the American Institute of Electrical Engineers: D. C. Jackson,* R. E. Doherty, E. L. Moreland.

"Representing the American Society of Mechanical Engineers: S. W. Dudley, H. R. Westcott.

"Representing the American Institute of Mining and Metallurgical Engineers: C. H. Mathewson and G. B. Waterhouse.

"Representing the American Institute of Chemical Engineers: B. F. Dodge and W. G. Whitman.

"H. P. Hammond, Chairman: representing the National Council of State Boards of Engineering Examiners; Member, E. C. P. D. Committee on Engineering Schools.

REGION II, MIDDLE STATES AND MARYLAND

"Representing the S. P. E. E.: D. S. Kimball, E. A. Holbrook, Louis Mitchell.

"Representing A. Soc. C. E.: Louis Mitchell, J. P. H. Perry, J. K. Finch.

"Representing A. S. M. E.: E. F. Church, Jr., D. S. Kimball, Herman Diederichs.

"Representing A. I. E. E.: A. M. Dudley, O. W. Eshbach.

"Representing A. I. M. M. E.: E. A. Holbrook and T. T. Read.

"Representing A. I. Ch. E.: H. C. Parmelee, W. N. Jones, A. B. Newman.

* Professor Jackson was out of the country during the past year and was therefore not able to participate in any of the accrediting program.

"Representing N. C. S. B. E. E.: J. W. Barker, F. O. X. McLoughlin.

"Karl T. Compton, Chairman: Member, E. C. P. D. Committee on Engineering Schools.

"Reports prepared by these committees will be considered by the Committee on Engineering Schools at a meeting to be held on June 26 to 28, 1936, inclusive, and final recommendations will be prepared at that meeting for presentation to E. C. P. D., presumably at its annual meeting in October, 1936. These recommendations will take one of the following forms:

"1. To include the curriculum in question on the E. C. P. D. list of accredited curricula.

"2. To defer action, or to include the curriculum on the list when, or if, improvements are effected.

"3. Not to include the curriculum on the list. It is expected that the E. C. P. D. list of accredited curricula of institutions in Regions I and II will be made public shortly after the October meeting. Until then the results of the work to date cannot be made known.

"As a particular phase of the procedure to date it should be explained that recommendations as to curricula in Chemical Engineering based upon reports of the representatives listed above will be submitted to the Committee on Engineering Schools of E. C. P. D. by the Committee on Chemical Engineering Education of the American Institute of Chemical Engineers. All visits of inspection of curricula not previously accredited by A. I. Ch. E. were made concurrently with the general inspections of other curricula and the committees have functioned throughout as a single unit in each region. The Committee on Engineering Schools is recommending to E. C. P. D. for inclusion in its list of accredited curricula all curricula in Chemical Engineering previously approved by the American Institute of Chemical Engineers.

"The program of accrediting in the other five regions was launched within the past two months in the same manner as in Regions I and II, by notification to the institutions that upon invitation E. C. P. D. is prepared to consider curricula submitted with a view to accrediting. Active prosecution of the program will begin in the autumn. Institutions in Regions I and II that have not previously invited inspection will also be considered during the next academic year upon their request. It is expected that the first comprehensive stage of E. C. P. D. program will be completed by June, 1937, and that the list of accredited curricula for all regions will be published by October of that year.

"In concluding this report it may be of interest briefly to summarize certain results and impressions of the accrediting program as conducted thus far:

"Of primary importance to the general welfare of engineering education, it is evident that the accrediting program can be, and has been thus far, of direct benefit in bringing about improvements in a considerable number of the institutions. These benefits have resulted from recommendations, based upon the inspection and evaluation of assembled data, looking to improvements or additions to staff or facilities, changes in curricula, etc. In some instances such changes or improvements have

been made a definite condition precedent to the submission of a favorable report on accrediting. In others they have been made as the result of informal suggestions and recommendations. In either case the recommendations have had prompt and, in some cases, salutary results. In every case we believe they have been constructive.

"It is our belief also that the basis of valuation, which is largely founded on appraisal of quality of work and of standards rather than on fixed quantitative criteria, and is thereby more difficult to apply than the older and more rigidly limiting basis of valuation, has, nevertheless, provided the means of making accurate valuations. We feel that the list of accredited curricula, when published, will be recognized as a properly discriminating one."

R. I. Rees, Chairman of the Committee on Relations with other Engineering Societies, reported on the activities of E. C. P. D.'s Committee on Professional Recognition. The Committee recommended, if feasible, that the dates of our annual meetings be set two years ahead and arrange every year to have our meeting at a place near one of the founder societies' meeting. Recommendation adopted.

The report of the Committee on Engineering Degrees was accepted as printed in the JOURNAL OF ENGINEERING EDUCATION and the Committee discharged.

The following petitions were approved:

The formation of the Michigan Section,
The formation of the Division on Mathematics,
The formation of the Division on Chemical Engineering.

A. A. Potter, President of the American Engineering Council, spoke on the work of that organization. A. E. C. has two functions: 1, to represent the various engineering societies in government matters; 2, to act as a board of inquiry in connection with certain matters of social and economic matters.

H. M. McCully, Chairman of the Division on Drawing which had conducted a Summer School prior to the meeting, reported that there were 89 teachers from 48 colleges registered at this school; that the seminar type of program was very effective; and that the group wished to have such a school repeated frequently.

P. T. Norton reported for the conference on engineering economy and motion was passed that a committee be appointed to study this subject and, if it seems desirable, that we have similar conferences at succeeding annual meetings, and that the present committee suggest names to the President for this committee.

Council approved the recommendation of the Executive Committee that no more Life Members be designated at the present time. Council also authorized the appointment of a committee to

study the whole question of life membership, this committee to report at the next annual meeting.

R. I. Rees was elected a representative of this Society on E. C. P. D.

H. S. Jacoby was elected a representative of this Society on the American Council on Education.

The following applications for institutional membership were referred to the Executive Committee with power to act:

Lewis Institute, Scranton-Keystone Junior College, Connecticut State College, University of Santa Clara, Los Angeles Junior College, Northwestern University, Fenn College, Wayne University, Texas College of Arts & Industries.

Invitations to hold the 1937 meeting were received from the Engineering Schools of Metropolitan New York, and from Harvard University and Massachusetts Institute of Technology. The invitation to meet at Cambridge was accepted. Dates suggested were Wednesday, Thursday, Friday and Saturday, June 23–26—Monday and Tuesday for clinic on Mechanical Engineering.

An invitation to meet in 1938 at the A. & M. College of Texas was accepted.

The invitation from the Engineering Schools in California to meet there in 1939 was received by the Council for consideration in 1937.

The reaction of the Council was favorable to the type of report presented by the Committee on Progress and printed in the JOURNAL.

The Society is not to print the report on technical institutes presented by R. H. Spahr at the 1933 meeting of the Society.

C. G. Thatcher, Chairman of the Committee on Sections and Branches, reported on the activities of that committee.

R. I. Rees presented the report of the Committee on Technical Institutes and upon motion the report was referred to the Publication Committee.

B. M. Brigman, for the members attending the reunion of the Purdue Summer School on Mechanical Engineering, requested permission to hold a three-day clinic on the teaching of mechanical engineering immediately before the next annual meeting at no cost to the Society. Permission was granted.

H. L. Creek, Chairman of the Committee on English, presented the following action of that group. Request granted and referred to the incoming President.

"That in the interest of a closer integration of the engineering curriculum, the Council of the S. P. E. E. is requested to authorize an investigation of the objectives of English instruction in engineering colleges

and of the training of English teachers of technical students; and that the President of the Society appoint a committee consisting of technical, as well as English teachers, to conduct this investigation."

F. L. Plummer, Chairman of the Civil Engineering Division, presented the following action of that Division. Motion made that the incoming President appoint a committee to study this matter and recommend action to Council:

"Discussion at the meeting of the Civil Engineering Division and at the symposium on the Coördination of Engineering Research has indicated an active interest in the establishment of a central clearing house for information on activity and progress in engineering research.

"In order that action may be taken in the matter, the Council of the Civil Engineering Division requests the Council of the S. P. E. E. to take steps toward the establishment of such a service either by this Society or through coöperation with or recommendations to other interested organizations.

"This communication is conveyed to the Council of the S. P. E. E. with the knowledge and endorsement of the Committee on Engineering Research."

Twenty-one individual members were elected.

The following budget for 1936–37 was adopted:

RECEIPT:			
Dues, 121 institutions at $15.00			
1850 individuals at $4.50			$10,315.00
Back dues			700.00
Advertising			1,600.00
Sale of publications			400.00
Estimated receipts			$13,015.00
DISBURSEMENTS:			
Meeting, including conferences		$ 800.00	
Journal and Proceedings		5,900.00	
Secretary's honorarium		1,300.00	
Clerical assistance		3,400.00	
Sundry printing		200.00	
Committee expenses		150.00	
Postage, telephone, supplies		500.00	
Travel, Secretary's office		400.00	
Dues: Amer. Counc. Ed.	$100.00		
Amer. Eng. Coun.	250.00	350.00	13,000.00
Estimated surplus			$ 15.00

Respectfully submitted,

F. L. BISHOP, *Secretary.*

MINUTES OF THE 44TH ANNUAL MEETING

The 44th annual meeting of the Society for the Promotion of Engineering Education was held at the University of Wisconsin, Madison, Wis., Tuesday, June 23 to Friday, June 26, 1936. There were 1,157 members and guests registered, representing 128 colleges and universities and 40 industrial concerns. The theme of the meeting was "The Spiritual Adjustment of the Engineering Student." Meetings were held in the Memorial Union Building and in the Engineering Building .

There were 23 conferences held in connection with the meeting —Chemical Engineering, Civil Engineering, Comprehensive Examinations, Coöperative Engineering Courses, Electrical Engineering, Engineering Economy, Engineering Research, English, Graduate Study, Industrial Engineering, Junior Colleges, Machine Design, Management, Manufacturing Processes, Mathematics, Mechanical Engineering, Mechanics, Mining and Metallurgical Engineering, Orientation of Freshmen, Physics, Professional Status of Graduates, Relations with Trade Associations, and Sections and Branches. The Division of Drawing held a summer school for teachers of drawing and descriptive geometry at the University of Wisconsin, June 19–22; and a summer school on economics was held under the auspices of the Society at Stevens Institute of Technology Summer Camp, June 28–July 5. The conferences were held on Tuesday and Wednesday afternoon and evening, and on Thursday morning; many luncheon and dinner meetings were also scheduled by these groups.

Council members were the guests of the University of Wisconsin at dinner at the Blackhawk Country Club on Tuesday evening. At the same time the ladies of Council members were guests of the University at a dinner and entertainment in the Memorial Union Building.

On Tuesday, there was a breakfast meeting of the Council with the Chairmen and the Secretaries of the conferences, with Vice-President P. H. Daggett, who was in charge of arranging the conferences, presiding. Many valuable suggestions and criticisms were made and the group passed a motion that a Committee on Conferences be appointed by the incoming President with one of the Vice-Presidents as the chairman.

On Wednesday, the Iowa-Wisconsin Section of the Society held a business meeting; the Purdue Summer School group held a reunion; the M. I. T. alumni had a meeting; and in the evening the University entertained the members on the terrace of the Memorial Union Building.

On Thursday, the Southeastern Section met for luncheon; President and Mrs. Glenn Frank gave a reception; and at seven the annual dinner was held in the beautiful ballroom of the Memorial Union Building at which there were 587 in attendance.

TUESDAY, JUNE 23, 1936

The opening session convened at ten o'clock with President D. S. Anderson in the chair. F. E. Turneaure, Dean of the College of Engineering, welcomed the Society to the University. In his address he mentioned the fact that 26 years ago the Society had met at the University and that 151 were in attendance, and called attention to the progress which the Society has made since that time. NOTE: 1,157 registered at this meeting in 1936. Glenn Frank, President of the University of Wisconsin, addressed the Society on "the political and social and economic and broadly human implications of engineering as a representative aspect of the whole field of applied science." Vice-President Daggett took the chair while President Anderson delivered his presidential address, "The Spiritual Adjustment of the Engineering Student." D. W. Mead, President of the American Society of Civil Engineers, spoke on Instruction on Professional Life and Conduct. This was followed by Maturing the Engineer by R. I. Rees. O. M. Leland, Chairman of the Committee on Engineering Degrees, reported that the committee had finished its work with the publication of the report in the JOURNAL. The report was accepted and the Committee discharged with thanks.

WEDNESDAY, JUNE 24, 1936

The second session convened at 9:30 A.M., President Anderson presiding. The first paper was by R. L. Sackett, Pennsylvania State College, on Character Building. John R. Bangs, Jr., Cornell University, read the paper prepared by D. S. Kimball, who was unable to attend the meeting, on Learning, Morals and Manners. The third paper was by Thos. E. French, The Ohio State University, on the Drawing Departments' Opportunities in Spiritual Adjustment. The discussion of these papers was opened by Hale Sutherland, Lehigh University, followed by Fred E. Ayer, University of Akron, C. J. Freund, University of Detroit, F. C. Caldwell, The Ohio State University, G. H. Shepard, Purdue University, L. H. Rittenhouse, Haverford College, and H. S. Rogers, Polytechnic Institute of Brooklyn. H. P. Hammond, Polytechnic Institute of Brooklyn, presented the report of the Committee on Graduate Study, and W. C. John, U. S. Office of Education, commented briefly on the report. Geo. B. Thomas, Bell Telephone

Laboratories, gave some statistics in connection with this report. The Treasurer, W. O. Wiley, presented his report and the report of the Secretary, F. L. Bishop, was read by title. The following were appointed members of the Committee on Resolutions: H. S. Evans, Colorado, Chairman; F. C. Vilbrandt, Virginia; J. M. Robert, Louisiana; C. E. Tucker, Massachusetts; and W. M. Cobleigh, Montana.

THURSDAY, JUNE 25, 1936

The third session was called to order at two o'clock by Vice-President Daggett. This session was in the form of demonstration interviews arranged by John R. Bangs, Jr., Cornell University. The participants were M. M. Boring, General Electric Company; H. S. Johnson, Gisholt Machine Company of Madison, Wis.; and Howard L. Davis, New York Telephone Company. The students were from the University of Wisconsin—C. J. Halamak, Leo S. Nikora and H. C. Mayland. H. S. Rogers, A. A. Potter, R. L. Sackett, and F. A. Magoun contributed to the discussion.

The annual dinner was held at seven o'clock with President Anderson presiding. The Society was honored in having as its first speaker, His Excellency, Phillip F. LaFollette, Governor of the State of Wisconsin. The second speaker was Francis P. Gaines, President of Washington & Lee University.

The Chairman of the Committee on Lamme Award, E. B. Roberts, Westinghouse E. & M. Co., presented the report of that committee which recommended that the ninth Lamme medal be awarded to Herman Schneider, Dean, University of Cincinnati.

The Nominating Committee presented the following report and upon motion the Secretary cast the unanimous ballot of the Society for the officers and the members of Council:

For President: H. P. Hammond, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

For Vice-President: I. C. Crawford, University of Idaho, Moscow, Idaho; Sada A. Harbarger, Ohio State University, Columbus, Ohio.

For Secretary: F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

For Treasurer: W. O. Wiley, John Wiley & Sons, Inc., New York City.

For elective members of Council for three years: S. M. Dudley, Yale University; O. W. Eshbach, American Tel. & Tel. Co.; H. J. Gilkey, Iowa State College; E. A. Holbrook, University of Pittsburgh; F. W. Marquis, Ohio State University; R. W. Morton, Colorado School of Mines; R. L. Sweigert, Georgia School of Technology.

Past Presidents Sackett and Rees escorted the President-Elect to the platform. President Anderson in congratulating Mr. Hammond said: "In the many years that I have been coming to these meetings, I have often wondered, if I may so, why Professor Hammond had not been elected to this position before. I have come to the conclusion that he has been such a valuable worker and has done so much good work for the Society as a whole that his election to the presidency would really defeat some of the best purposes of the Society." In accepting the presidency of the Society for 1936–37, Professor Hammond said: "The only thing I can do on the spur of the moment is to try to analyze some of the feelings that this honor brings to me. Of course, first of all there is the feeling of gratitude to you, Mr. President, for your gracious introduction, and to all of you here. Then there is a very distinct feeling of apprehension. This Society has become a very complex organization. It has come to have a great many activities, a great many divisions and branches and, may I digress to say, it functions under a very small but very efficient organization. I wonder sometimes how all these things in which the Society is engaged can be done under a permanent staff of two: a Secretary and an Assistant Secretary in Pittsburgh. To be inducted into the group of officers of that organization causes me a great deal of apprehension.

"Then I have a feeling of resignation. I had better explain, perhaps, to our guests that the ex-Presidents of this Society serve permanently on its board of directors, the Council of the Society. The Constitution so provides, and there seems to be no idea of changing our Constitution. One of the customs of the Society is to have seven-o'clock breakfasts for the Council, and I look forward with resignation to a long, continuing series of those.

"But finally, I have a distinct feeling of humility. I am prompted to say this and am reminded of it by what President Anderson said last year. There is a feeling of humbleness in joining the long line of distinguished men who have graced the chair. No one, I think, could have any feeling except one of humbleness in joining that group."

FRIDAY, JUNE 26, 1936

The fourth session was held at 9:30 A.M. Isador Lubin, Commissioner of Labor Statistics, U. S. Department of Labor, presented a report of the study of engineers which he has been making. This report was discussed by C. E. Davies, American Society of Mechanical Engineers; G. H. Shepard, Purdue University; H. L. Bowman, Drexel Institute; E. F. Chandler, University of North

Dakota; J. E. Walters, Purdue; H. P. Dutton, Armour Institute of Technology; and F. A. Kartak, Marquette University. C. W. Park, University of Cincinnati, read his paper, A Glance toward Culture, which was discussed by B. E. Fernow, Clemson; M. M. Robinson, Fenn College; H. W. Bibber, Ohio State University; C. L. Wilson, Montana Mines; W. F. Gerhardt, Wayne University.

The fifth session convened at two o'clock. G. M. Butler, University of Arizona, read his paper on Should Engineering Curricula Be Lengthened? W. E. Duckering, University of Alaska, discussed a Five-Year Engineering Curriculum. B. R. Van Leer, University of Florida, Chairman of the Committee on Two-Year Terminal Program, presented the report of that committee. Karl T. Compton, Massachusetts Institute of Technology, Chairman of the Committee on Accrediting of Engineering Colleges of the Engineers' Council for Professional Development, gave a report of progress. James Ferebee, President, National Council of State Boards of Engineering Examiners of Wisconsin, discussed the work of the above committee. The report of the Committee on Comprehensive Examinations was read by title. Secretary Bishop read the report of the Committee on Resolutions which was unanimously adopted: "Having been called together in this 44th annual convention at the University of Wisconsin, and having considered, through the good judgment of our officers, some of the problems of 'The Spiritual Adjustment of the Engineering Student,' we have become more acutely aware as the meeting has progressed towards its close that the engineering *teacher* as well as the student may need to think on these things.

"Believing as we do that no happier place or more understanding hosts could have been chosen for the consideration of such an important theme, and wishing to give formal expression of our appreciation of the well-laid plans for the success of the meeting and for the conveniences and pleasures which we have enjoyed while here, therefore be it resolved:

"That the thanks of this Society shall be tendered to President Glenn Frank for his scholarly and thought-provoking address at our opening session, and to President and Mrs. Frank for the delightful reception for our members and guests on Thursday afternoon;

"To Dean F. E. Turneaure, Past President of the Society, for his hearty welcome to the University of Wisconsin and for his constant interest in the successful conduct of our convention both before and during the sessions;

"To the Honorable Phillip F. LaFollette, Governor of Wisconsin, to President Francis P. Gaines of Washington and Lee Univer-

sity, and to our other guest speakers for contributing so much to our program;

"To the members of the General Committee, Dean Turneaure, Professor F. M. Dawson, and Professor Ben G. Elliott, and to all members of their subcommittees for their untiring attention to major arrangements and minor details, the carrying out of which has made the convention both profitable and pleasant;

"To the General Chairmen of the Ladies' Committees, Mrs. A. V. Millar and Mrs. P. H. Hyland, and to their associates, all of whom have provided so generously and delightfully for the entertainment and pleasure of our visiting ladies and for the care of our children;

"To the Blackhawk Country Club and the Maple Bluff Country Club for the generous use of their facilities;

"To all those who have given of their time and efforts to the departmental conferences which have been interspersed throughout our program and which have added greatly to our understanding of our educational problems;

"And finally that our thanks and appreciation shall be expressed to the personnel of the University of Wisconsin and especially to the Faculty of the College of Engineering, and also to the members of local organizations and to those individuals in this hospitable community who have through their efforts and generosity made this, our largest convention, one long to be remembered and worthy in every way of the ideals which our Society is attempting to promote."

The meeting adjourned at four o'clock to meet in 1937 at Cambridge, Mass.

NEW MEMBERS

ALMFELDT, MAURICE W., Assistant Instructor in Mechanical Engineering, Rhode Island State College, Kingston, R. I. R. L. Wales, C. D. Billmyer.

BEBIE, JULES, Consulting Chemical Engineer, 4207 Magnolia Avenue, St. Louis, Mo. E. L. Ohle, E. O. Sweetser.

BLACK, PAUL H., Associate in Mechanical Engineering, University of Illinois, Urbana, Ill. O. A. Leutwiler, C. W. Ham.

CHAPMAN, THOMAS G., Professor of Metallurgy, University of Arizona, Tucson, Ariz. John Park, G. M. Butler.

CUNNINGHAM, JOHN B., Professor of Mining and Metallurgy, University of Arizona, Tucson, Ariz. John Park, G. M. Butler.

CURRIE, WILLIAM C., Instructor in Mechanic Arts, University of Arizona, Tucson, Ariz. John Park, G. M. Butler.

DERBY, J. RAYMOND, Professor and Head, Dept. of English, Iowa State College, Ames, Iowa. W. Paul Jones, Paulus Lange.

DOAN, GILBERT E., Associate Professor of Metallurgy, Lehigh University, Bethlehem, Pa. Bradley Stoughton, Allison Butts.

DOLAN, THOMAS J., Instructor in Theoretical and Applied Mechanics, University of Illinois, Urbana, Ill. F. B. Seely, W. M. Lansford.

EVANS, THOMAS H., Assistant Professor of Civil Engineering and Mechanics, University of Virginia, University, Va. W. S. Rodman, F. L. Morse.

FECHHEIMER, CARL J., Director, College of Electrical Engineering, Milwaukee School of Engineering, Milwaukee, Wis. F. L. Bishop, Nell McKenry.

FILLION, STANLEY H., Instructor in Civil Engineering, Worcester Polytechnic Institute, Worcester, Mass. Jerome W. Howe, Arthur J. Knight.

FORD, WALTER S., Assistant Professor of Electrical Engineering, Drexel Institute, Philadelphia, Pa. R. C. Disque, C. A. Kapp.

HETZEL, THEODORE B., Graduate Assistant and Research Fellow, Pennsylvania State College; Sept. 1, Instructor, Haverford College. A. E. Neyhart, C. E. Bullinger.

HOWE, HAROLD B., Assistant Professor of Civil Engineering, Rensselaer Polytechnic Institute, Troy, N. Y. G. K. Palsgrove, G. M. Phelps.

KINNEY, JOSEPH S., Instructor in Civil Engineering, Rensselaer Polytechnic Institute, Troy, N. Y. J. G. Fairfield, G. K. Palsgrove.

KOEHLER, W. A., Professor of Chemical and Ceramic Engineering, West Virginia University, Morgantown, W. Va. G. P. Boomsliter, W. W. Hodge.

LESTER, BERNARD, Lecturer, University of Pittsburgh; Assistant Sales Manager, Industrial Dept., W. E. & M. Co., East Pittsburgh, Pa. E. A. Holbrook, F. L. Bishop.

LOFGREN, KENNETH E., Instructor in Machine Design, Cooper Union, New York City. C. H. Young, G. F. Bateman.

MACKAY, SCOTT, Professor of Ferreous Metallurgy, Rensselaer Polytechnic Institute, Troy, N. Y. J. G. Fairfield, R. P. Baker.

MCCURDY, HENRY B., Assistant Manager, College Dept., The Macmillan Company, 60 Fifth Avenue, New York City. H. P. Hammond, E. J. Squire.

MOREHOUSE, THEODORE C., Manager, College Dept., The Macmillan Company, 60 Fifth Avenue, New York City. H. P. Hammond, E. J. Squire.

REED, FREDERICK J., Instructor in Mechanical Engineering, Duke University, Durham, N. C. R. S. Wilbur, H. C. Bird.

RISING, JAMES S., Instructor in Engineering Drawing, Rensselaer Polytechnic Institute, Troy, N. Y. G. M. Phelps, E. F. Chillman.

RUTH, BURRELL F., Instructor in Chemical Engineering, University of Minnesota, Minneapolis, Minn. G. H. Montillon, C. A. Mann.

RYAN, DAVID G., Assistant Professor of Mechanical Engineering, University of Illinois, Urbana, Ill. O. A. Leutwiler, C. W. Ham.

SALTZER, BERTRAM H., Assistant Professor of Mechanical Engineering, Gettysburg College, Gettysburg, Pa. C. G. Reen, F. H. Clutz.

SHILTS, WALTER L., Assistant Dean of Engineering, Professor of Civil Engineering, University of Notre Dame, Notre Dame, Ind. Thos. A. Steiner, A. A. Potter.

THOMPSON, SOPHUS, Professor of Civil Engineering, Southern Methodist University, Dallas, Texas. E. H. Flath, John M. Bird.

TICE, LAWRENCE W., College Representative, International Textbook Co., Scranton, Pa. C. C. Williams, G. W. Farnham.

WARNOCK, WALTER G., Assistant Professor of Mathematics, Fort Hays Kansas State College, Hays, Kansas. R. A. Seaton, M. A. Durland.

WEIL, ROBERT T., Instructor in Electrical Engineering, Manhattan College, New York City. Brother A. Leo, J. G. Seidl.

WHITEWELL, J. C. Instructor Chemical Engineering, Princeton University, Princeton, N. J. J. C. Elgin, A. M. Greene.

WILKINSON, ROGER I., Engineer, Systems Development Dept., Bell Telephone Labs. Inc., 463 West St., New York City. R. I. Rees, O. W. Eshbach.

WOODS, JOHN E., Director, Municipal University of Omaha, Omaha, Nebr. F. L. Bishop, Nell McKenry.

REPORT OF TREASURER

W. O. WILEY

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION
STATEMENT OF CASH ACCOUNT
JUNE 18, 1936

BALANCE ON HAND—JUNE 17, 1935		$ 4,170.40
RECEIPTS:		
Current Dues	$10,858.10	
Back Dues	955.25	
Dues in Advance	103.00	
Sales of Publications	488.69	
Advertising	1,385.00	
Miscellaneous Income	1.40	
Refund by Summer Session Account	31.19	
Receipts from Sales of Certificates and Emblems	103.50	
Receipt from Carnegie Fund (to close account)	746.56	
Receipt from Research Fund (to close account)	23.70	14,696.39
Total		$18,866.79
DISBURSEMENTS:		
Cost of Publications	$ 6,386.52	
Cost of Proceedings	288.67	
Honorarium for Secretary	1,300.00	
Salaries—Secretary's Office	3,400.00	
Traveling Expenses—Secretary's Office	476.30	
Committee Expenses	166.52	
Printing, Postage, Office Supplies, etc.	994.15	
Expenses—1935 Meeting	683.27	
Expenses—1936 Meeting	396.21	
Dues—American Council on Education	100.00	
Dues—American Engineering Council	187.50	
Cost of Certificates and Emblems	717.75	15,096.89
BALANCE ON HAND—JUNE 18, 1936		$ 3,769.90

Note—In addition to the above balance, there is on deposit at the Forbes National Bank, Pittsburgh, Pa., in Saving Account No. 3809 the amount of $6,000.00 with accured interest of $1,147.69 to June 1, 1936.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION
INCOME AND EXPENSE STATEMENT
For the Year Ending June 18, 1936

EXPENSE

Cost of JOURNAL	$ 6,486.52
Cost of Proceedings	288.67
Expenses—1935 Meeting	1,036.25

Honorarium for Secretary	1,300.00
Salaries—Secretary's Office	3,400.00
Printing, Postage, Office Supplies, etc.	994.15
Traveling Expense—Secretary's Office	476.30
Committee Expenses	166.52
Dues—American Council on Education	100.00
Dues—American Engineering Council	187.50
Cost of Emblems and Certificates	717.75
	$15,153.66
Surplus for the Year	64.58
	$15,218.24

INCOME

Current Dues	$11,635.10
Back Dues	715.25
Sales of Publications	488.69
Advertising	1,328.66
Sales of Emblems and Certificates	103.50
Interest on Savings Account	175.38
Miscellaneous Income	1.40
Received from Carnegie Fund and Research Fund (to close accounts)	770.26
	$15,218.24

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION
BALANCE SHEET
JUNE 18, 1936

ASSETS

Cash:		
Current Fund	$3,769.90	
Petty Cash Fund	300.00	
Life Membership Fund	784.76	
Benj. G. Lamme Fund	152.00	$ 5,006.66
Savings Account:		
Forbes National Bank—No. 3809		7,147.69
Benj. G. Lamme Trust Fund:		
Securities	$4,947.00	
Cash	53.00	5,000.00
Prepaid Expenses—1936 Meeting		396.21
Inventory		1.00
Accounts Receivable:		
Current Dues	$ 600.00	
Advertising	197.16	
Lamme Medal Fund	900.00	1,697.16
Furniture and Office Equipment (Estimated)		100.00
		$19,348.72

LIABILITIES

Life Membership Fund		$ 784.76
Benj. G. Lamme Fund		5,152.00
Prepaid Membership Dues		103.00
Accounts Payable		600.00
Surplus Accounts:		
Balance at June 17, 1935	$12,644.38	
Surplus for Present Year	64.58	12,708.96
		$19,348.72

REPORT OF THE SECRETARY, 1935–36

F. L. BISHOP

I do not need to remind you that the past few years have been trying times for educational institutions and organizations of the character of this Society. It may be said that the Society has come through this period in a satisfactory condition. The report of the Treasurer, W. O. Wiley, shows the Society in a good financial condition. Through the wise action of the Council, the Society was able, during this period, to reduce its dues to individual members by 10 per cent and still maintain its financial position on a sound basis. While in many ways the current year has been one of the most satisfactory, it has been a difficult matter to keep the expenses within the income. In spite of this, however, the Secretary would recommend that the dues for 1936–37 be reduced by 10 per cent, as in the past year, for all those who pay their dues on or before January 15, 1937.

The keynote of the meeting, The Spiritual Adjustment of the Engineering Student, has awakened a remarkable response. This thought evidently has been in the minds of our members but President Anderson was the first to make it an issue. One of the chief difficulties of the Program Committee was the danger of overloading the program, so many members and others desired to present papers on this topic.

Membership.—One of the astounding things of the current year, due to the work of the Membership Committee under the chairmanship of President Anderson, is the fact that we have added 256 new members—the largest number of new members ever added to the rolls of the Society in a single year. This brings the total membership to 2,406 individual and 121 institutional, a total of 2,527. The Executive Committee voted this year to drop those members who had been carried during the depression for one reason or another and who had not since that time paid any dues. As a consequence 130 were dropped. In addition we lost 14 by death —J. H. Hammond, Lewis Fussell, H. E. Nold, W. T. Magruder, O. W. Walter, R. W. Brock, S. R. Pritchard, L. G. Carpenter, C. C. O'Hara, R. M. Van Gassbeck, William Anderson, Carl Rossmassler, A. H. Beyer, I. A. Palmer—and 70 resigned.

Our membership now represents about 60 to 65 per cent of the teachers in the engineering colleges. It is obvious that an ideal condition would exist in this Society when its enrollment would include every teacher in the engineering colleges. When we met at

the University of Wisconsin in 1910, there were 848 members on the rolls of the Society and 151 members and guests were registered at that meeting. To-day we have 2,406 members on the rolls and 1157 members and guests registered at this meeting.

Executive Committee.—At the last meeting of the Society, the Executive Committee was reorganized to include the two vice-presidents. This has proved to be of distinct advantage in increasing the effectiveness of the work of the Society. Two specific duties were assumed by these vice-presidents—the First Vice-President, Dean P. H. Daggett, is in charge of conferences and the Second Vice-President, Dean S. B. Earle, has charge of institutional membership and the program for the meeting of that group.

Committee on Progress.—During the year 1934–35, President Williams appointed a Committee on Progress. This committee is a clearing house for the discriminating selection of the significant features of the year to which each chairman of S. P. E. E. activities contributes a record of outstanding events in his particular field. The first report of this Committee was published in the February, 1936, JOURNAL OF ENGINEERING EDUCATION.

Conferences.—This year the largest number of conferences in the history of the Society is scheduled. These have been arranged under the able leadership of Vice-President Daggett who has had the close coöperation of the chairman of each conference group.

Divisions.—The work of a division to one not a member of a division may not seem important, but to those who follow the activities of these groups the work is very important. We have six divisions of the Society and five of these have arranged conferences at this meeting, the sixth, the Division of Drawing, has arranged a Summer School on Drawing and Descriptive Geometry at the University of Wisconsin on the four days preceding this annual meeting. Some of the outstanding work of these divisions are the survey of civil engineering curricula made by that group; the clearing house of the Machine Design group; a study of the five-year engineering curricula by the Electrical Engineering group; etc. Many others could be cited but these examples will show the importance of the work of the divisions.

Summer Schools.—This year the Society has sponsored two summer schools, one on Engineering Drawing and Descriptive Geometry at the University of Wisconsin, and one on Economics at Stevens Institute of Technology the week following this annual meeting. The Drawing Division arranged and conducted the school for teachers of drawing, and a special committee handled the arrangements for the school on economics. It is hoped that other divisions of the Society will arrange for similar schools at future meetings. Immediately before or after the annual meeting seems a logical time for summer schools and is recommended to those contemplating holding such schools.

Sections and Branches.—The meetings of sections and branches are of importance and many requests come to this office for copies of papers presented at these meetings. It is the aim of the Publication Committee to publish, when possible, one or two papers from each of these meetings. These meetings are as important to some members as the annual meetings. They do not take the place of the annual meetings but fill a need which exists between the yearly meetings. Under the direction of Chairman C. G. Thatcher this work has been carried on in an effective manner. Some notable work has been done by the different groups and will be more fully dealt with in the report of the chairman.

Publications.—The Secretary's office, at a very low cost to the Society, has been able this year to prepare for publication an index of the Society's publications from the first publication of Vol. L of the Proceedings to the end of this fiscal year. This index, when published, should prove of great value to members and to libraries.

Employment Service.—This year the Secretary wrote to the president, the dean, and the head of each department in every engineering school asking him to list with us the vacancies which he had or which he expected to have during 1936–37. Many institutions listed vacancies while others, perhaps as a matter of policy, did not. As usual we had many more requests for positions than we had positions to fill.

Enrollment.—The Society again secured the enrollment in engineering colleges and published the result in the December number of the JOURNAL OF ENGINEERING EDUCATION. The Secretary is grateful to Dr. H. P. Hammond for his work in preparing the form of questionnaire to be sent out for securing the enrollment of undergraduate and for graduate students. I believe that a study of the individual enrollment in different institutions throughout the country indicates distinctly that there is a definite relation between the growth of the institution and the activities of the members of the faculty in this Society.

Investigation of Engineering Education.—It is interesting to note that, though the investigation of engineering education was made several years ago, the number of persons quoting from it in articles in many magazines has increased materially. Many members, in papers and report, have suggested that the investigation be continued.

S. P. E. E. Emblem.—Council authorized the Secretary to make available to the members certificates of membership, pins and charms. Designs for pins and charms were prepared by Whitehead and Hoag Company and approved by the Council. Valuable assistance was given to the Secretary in the preparation of the certificate of membership by Mr. M. K. Dutton. The emblems and the certificate may be secured by members at the office of the secretary.

ACCREDITING OF ENGINEERING SCHOOLS

By KARL T. COMPTON, Chairman

I have been asked to explain briefly the accrediting program of the Engineers' Council for Professional Development, and to report on the progress which has been made to date.

The E. C. P. D., as you know, was organized in 1932 for the expressed purpose of improving the status of the engineering profession. This the Council was to do through a program of selection, guidance, training, and certification. The Committee on Engineering Schools, one of the four operating committees of this standing committee was expected "to formulate criteria for colleges of engineering, which will insure to their graduates a sound educational background for practicing the engineering profession."

There seemed to be a very great need for a standing committee of E. C. P. D. to consider the problems of engineering schools. First and foremost came the question of accrediting. That seemed to be particularly pressing because of the needs of the state board of engineering examiners which now require licensing in, I think, some 35 or 36 states of the Union. In connection with the licensing requirements and the listing of accredited schools, in order to avoid duplication and in order to have the lists made up in a manner that would be as satisfactory as possible to the engineering profession itself, it seemed that there was a real opportunity and responsibility for carrying out this job of accrediting. Since its formation the Committee has devoted itself entirely to the subject of the accrediting of undergraduate curricula in engineering. It has a somewhat larger program, both with regard to accrediting, as well as along other lines, which it expects to give its attention to after its present program has reached a somewhat more advanced stage.

The Committee on Engineering Schools was appointed with seven members, one to represent each of the seven societies that have formed the Engineers' Council for Professional Development, namely, the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Institute of Chemical Engineers, the National Council of State Boards of Engineering Ex-

aminers, and the S. P. E. E. One member from each of these societies formed the Committee.

The first year we spent principally on the process of orientation and in trying to lay out a program, starting with the study of the accrediting experiences of other agencies, such as the American Medical Association, the Association of American Law Schools, and the American Institute of Chemical Engineers, the last of which has had a very effective program in operation for some time.

On the basis of this study we decided that it would be a mistake to attempt to accredit institutions. Obviously an institution with one weak curriculum, but otherwise rather strong would present no small problem. It seemed advisable, therefore to consider for accrediting each curriculum. It furthermore appeared inadvisable to accredit a curriculum on anything like a formula basis, in which a certain number of standard hours for admission or graduation could be set up, or the numerical content of this or that. The setting up of any such standards would, if they were accepted generally, tend to ossify engineering education right at that point and prevent a number of experiments which might be very desirable.

So we felt that rather it would be better to get as competent a group as we could to make an investigation and then depend upon the judgment of that group, taking everything that it thought significant into consideration, such as, for example, quanitative data as to the number of semester hours required for the degree, entrance requirements, degree of leniency in regard to admission with conditions, equipment of the institution, training and qualifications of the staff, financial security, administrative procedure, and so forth.

On that basis, then, a plan was drawn up for an examination that was based upon two principal features, one quantitative and the other qualitative, the quantitative being the kind of material that could be furnished by questionnaire and from the catalogs, the qualitative depending more on the personal judgment of the individuals who made the inspection of the institution. After having drawn up an effective questionaire, it was tried out on the dog, so to speak. The questionnaire was sent to each of the various institutions that were represented by these members of the committee, the registrars or deans of the institutions being asked to fill it out, provided, of course, the information desired was not such that it could not be filled out. We were then to see whether it gave the results that we desired. On the basis of this preliminary trial, certain changes were made. The questionnaire was finally adopted in the form in which it has been published as a report of the E. C. P. D.

While this was going on, the program for accrediting was before the seven engineering societies that made up the Engineers' Council for Professional Development for ratification. There was some delay in getting the final approval of those societies to go ahead with the program. This approval came through a little more than a year ago, with, however, a string attached to the effect that the program could be tried out in the New England and the Middle Atlantic States Regions. I believe that there were certain individuals in some of the societies who were not certain that the accrediting program could be put through, and hence were unwilling to authorize the whole program until it had been given a trial in a restricted area.

It has since been apparent that there was another very good and valid feature to that decision, of a financial nature. Funds have been available from two sources. The Engineering Foundation has made annual grants of sufficient amount to cover secretarial and office expenses, as well as other expenses incurred by the main committee of seven. The visits of inspection to the various institutions have been financed solely from fees charged for the necessary examination, the schedule being $100 for the first curriculum, and $50 for each additional curriculum, the maximum charge for any one institution being $400. It has been found necessary to accumulate a sufficient surplus from the visits in the New England and Middle Atlantic regions, Region I and II, as we call them, to help cover some of the expense of visits in the remaining five regions. The institutions in Region I and II are rather close together, whereas those in the farflung regions of the West and South are widely scattered. In order to have all the institutions bear an equal burden, a uniform charge has been made. Fortunately, our original estimate was surprisingly accurate, for a substantial amount of money remains, sufficient it appears, to enable us to carry on the program in the five regions which remain to be visited.

The visits of inspection are carried out by delegatory committees, nominated by the seven constituent engineering societies after a certain amount of consultation with our Committee on Engineering Schools. These seven societies have each nominated a member and an alternate for each of the seven delegatory committees. I think it is rather remarkable, considering the nature of the job, that in the first two regions where the work was undertaken by twenty-five men, involving the delegates appointed and their alternates, not a single man refused to serve. More recently, as we appointed these delegatory committees for the rest of the country, immediately after permission was obtained from the last

of the societies, only two out of seventy-one have indicated that they will not be able to accept the appointment.

The main committee started out first to orient itself with regard to the program, because each member of the main committee becomes the chairman of the delegatory committee in some one of the seven regions into which we have divided the country. In general, this chairman does not operate in his own region but in an adjoining region. For example, Professor Hammond of Brooklyn Polytechnic Institute has been chairman of the New England committee, while I have been chairman of the Committee for the Middle Atlantic States. The seven members of the main committee got together for the first two inspections, when Columbia University and the Stevens Institute of Technology were visited. Following that the full membership of the delegatory committees for these two regions were assembled by their respective chairman for one or two more trial visits. Since then, the institutions have been inspected by committees as small as four and, I think, as large as nine, some of the groups including alternates as well as the regular members.

The general procedure among these committees is to meet sometime in advance of the visit to an institution, generally the evening before, with the questionnaire in hand which all members have had a chance to examine beforehand. The questionnaire is discussed and such features noted as require additional information. Prior to the meeting individual assignments are given out and are so arranged that perhaps two members will visit the electrical engineering department, two other members will visit the chemical engineering department, and so on, while other pairs will be assigned to the service departments, such as physics, mathematics, the library, languages, and economics. On the day of the inspection, before visiting the various departments, the committee meets with the dean or the president of the institution, or both, and has a preliminary session with him, general matters are discussed, and the doubtful points in the questionnaire are cleared up. The committee then goes about the divided job of making an inspection of the various departments assigned. That same evening, the committee again meets, this time for a discussion of the findings of the individual committees of inspection.

After these committees have inspected every institution in the region which has applied, a meeting of the entire delegatory committee, all the fourteen members and alternates, is called. The results, which have, by that time, been put into typewritten form by the chairmen of the various committees of inspection, are carefully gone over, and conclusions and recommendations made. The

Region I and II Committees have had rather long sessions, largely because there have been a great many questions of policy which have had to be dealt with, as for example, how far should the committee go in considering degrees of specialization in the curricula, how should the night curricula be gauged in comparison with the day school curricula, and so forth. The Regional Committee, as a result of its long session, makes its tentative recommendation to go to the original committee of seven, which committee, in turn, reports to the Engineers' Council for Professional Development for final action.

In carrying out this work there have been two main objectives. The first objective set before us has been to draw up a list of accredited curricula. The second objective is a thing that has made me really enthusiastic about the job. It has been to be of the greatest possible help to the institutions which have been inspected. Continually throughout the discussions of the committees of inspection and that of the main committee later, there has been a consideration of all those points which, if brought to the attention of the administrative officers for action, would be helpful in increasing the effectiveness of the teaching program of the institution. In every case where improvements have seemed advisable, the administrative officers have been invited to ask for suggestions. In a great many instances the suggestions have been gratefully received and acted upon.

Naturally, I would hesistate to discuss individual cases in an open meeting of this sort, particularly since final action has not yet been taken on curricula at any institution. It might, however, be proper for me to mention the situation at my own institution. Professor Hammond, chairman of the New England committee also acted as chairman of the visiting committee. I stayed completely away from their proceedings and do not yet know what their recommendation is going to be. Dr. Hammond did, however, come to me during the course of the investigation with one criticism and a suggestion for both of which I was indeed grateful. I took up one with the faculty and the other with the corporation and succeeded in getting advantageous action on both of those points. As a result I feel that certain curricula at our institution have been considerably strengthened.

In another institution, a considerable sum of money had been received for the building of a new type of laboratory, and plans were already well on their way toward completion. Had the design of the laboratory been carried out according to the plans, it would have been seriously short in several respects. A member of the committee who was an expert in that particular field was able to offer a number of valuable suggestions. The plans have accord-

ingly been revised, and the president of the institution is most grateful to the committee.

In another institution we found a very excellent curriculum in one of the fields of engineering, excellent so far as it went, but almost entirely deficient in certain subjects which every man who starts in engineering in that field is supposed to know something about. Consequently, at the request of the dean of engineering, a member of the committee was delegated to point out to him this lack of balance in the curriculum. He was overjoyed since his alumni had been pressing him on that very point, and he was extremely anxious to get additional support. The indications are that the deficiency will be taken care of by next fall. I mention these simply as illustrations of the types of things that we have found it possible to do.

As I say, final action has not been taken on the curricula of any institution. There are several reasons for this. In the first place, the Engineers' Council for Professional Development is the body which takes final action, and the Committee on Engineering Schools has not yet presented to the Council its recommendations. The second reason is that it would be unfair for us to take final action until we have a better understanding of the country as a whole than we have at present. For reasons that I mention we have concentrated on New England and the Middle Atlantic States, and while the Committee on Engineering Schools is prepared to submit its recommendations to E. C. P. D. in October, any action that is taken will be tentative and subject to further amplification as experience grows in other parts of the country.

It was some time in April that letters went out to the presidents and deans of engineering in the remaining five regions of the country. There are 113 degree-granting engineering schools in these five regions. From the last report that I have here there have been 43 requests for accrediting from that particular group, so it is evident that the program is going to go through successfully, at least in so far as the job of actually visiting the institution is concerned.

The delegates, to a man, have worked most effectively. Their effectiveness will be a groundwork for the newly appointed delegatory committees. These new committees can start out with the greatest possible benefit from the experiences and mistakes that have been gained and made by our existing committees. Additional help will come from our plan to have a close initial tie-in between the new committees and the members of the committees in Regions I and II. As the programs get started in other regions we plan to have some of the members of these experienced committees that I have mentioned meet with the new committees for

the first few visits until the latter get organized. By so doing we hope to come as near as possible to the ideal of setting a uniform standard over the country. Complete uniformity is, of course, an impossibility, but we aim to keep our standards well within workable limits.

The reaction on the part of the institutions has been exceedingly gratifying. I am aware of two cases where criticisms came from institutions as to the way in which their cases have been handled. I think in one case the criticism was justified. I am sure that in the other case it was not, although that, of course, is a matter of personal opinion. There have been a great many expressions of gratitude over the way in which the matter has been handled and I hope that we will be able to proceed in the other regions with the same degree of coöperation from all points of view. I sincerely believe that this program is going to come out, not only with the accredited list for which we have such a decided need, but with a definite lift in the matter of engineering education, and a definite distribution among the institutions, particularly among the various administrative officers, of some of the best ideas in engineering education. For that, it has seemed to me, the job is well worth the rather considerable effort which is involved.

Discussion

James L. Ferebee: I represent the National Council of Engineering Examiners of the United States, which I think is a complementary body to your organization, for the reason that we are required in thirty-five states of the Union officially and legally to determine whether or not the product that you gentlemen turn out is in fact an engineer and not just a man with an engineering education. One of the troublesome questions, I suspect, to you and certainly to an examining board is what finally constitutes an engineer. Are we educating and licensing kings, generals, captains or what? Kings, generals and captains are necessary and are few in number and they mature long after the days of schooling, either by it or in spite of such schooling. After their necessary work is done and the tumult and schooling is over they disappear largely from the scene of action and the "spade" work still has to go on, and it is this work which is being done by the more recent graduate, and it is to do well this work that necessarily must be his first means of livelihood that the maximum study and training should be given, rather than over-emphasizing the more advanced and highly technical studies which in the days of early servitude may be of little use or be forgotten.

It is a rather grave question in my mind as to whether or not, with so much coördination, so much organization, the engineer as such is going to be elevated or debased. The educated engineer is now assuming his rightful position as the head of engineering organizations and this head zone is usually well crowded, but the necessary expansion in order to absorb the constant influx of well-educated engineers will, perhaps, be in the taking over the field now held by the engineering artisan or semi-technically trained man. That is borne out very clearly in the examination of engineers that constitute the rank and file of engineers of to-day. In the old days engineering education and opportunities for efficient engineering education were limited, and many men were made engineers by their own efforts and experience, and I must say that many very good engineers were thus made. However, with the creation of licensing or registration laws the employer of the engineer looks very definitely to the requirement that his employee must be registered or at least is capable of being so registered. Are we creating by the number of engineering graduates and the requirements of licensing laws a situation that a draftsman or rodman must be a registered engineer, or be capable of being prepared and educated at great expense and spending a lot of time in order to qualify for such minor positions. That is, we all talk about accredited schools. Does this lead to more technical training or to a broad scope of training which will make him more valuable to his employer and thus be able to earn a higher beginning salary comparable with his training? All of those things are things that disturb my mind very much when accrediting colleges and lengthening the years of college life are being considered.

The lengthening of the years of study to five years, provided you gentlemen give the students ample and sufficient things to do, is very desirable. I do not mean by that that you must increase the technical training. I think you give enough. I am speaking from the standpoint of both the engineering examiner and the employer of many engineers. I have yet failed to find a man whom we employ, generally speaking, who has not had sufficient technical ability, but many of them are very barren of knowing what constitutes an engineer. What is the thing that the engineer must do? When you put him into the field does he know how to deal with human beings? Here he does not have an opportunity to deal with calculations of stresses and materials or anything else, but to get results. He is dealing here with human beings, and I fear too much control may over-educate the engineer generally and make him poorly equipped for the outdoor work which is

the great reservoir of the civil engineer. I do not know whether you can teach that or not, but I think you ought to try because that is the failure of more engineers than any other thing. They do not know whether to drink whisky or carouse around as they see most of their associates doing, or what their conduct should be to maintain the dignity of the profession and their own advancement. What is it he thinks? What is his code of ethics towards the contractor with whom he is working, to his employer and to his work as an example of engineering? The great Society of Civil Engineers has ethics applying to men who are consulting engineers. I fail to see any written document that attempts to set forth to young men the things they should do, both for themselves and for their profession. We hope that this might be corrected.

This extra time that you gentlemen have discussed (and I agree you should have it) should be divided for those things which are essential to the young engineer and more essential than whether or not he knows all the sciences. I am not decrying the sciences, but you must remember that the young man has to labor for a long time before he becomes a real engineer.

The lengthening of the term of engineering education fits in very definitely with registration of engineers. In general, the laws for registration of engineers requires a minimum of three years after college graduation, or the equivalent thereof. In the state of Wisconsin, to those colleges which give five-year terms we give five years' credit. To those schools which are not accredited, under our law, we are only permitted to give one-half a credit for each year of study.

The question of the engineer's examination is here. We can not avoid it. It is a complicated system differing in 35 states out of 48. It is the work of the National Council to coördinate these various requirements just as accrediting of schools will attempt to meet the present differences in education of the engineer. I think within the next five or ten years we must register each and every practicing engineer. At the present time if a man graduates from college he has to have three years of practical experience, as a rodman, instrumentman or inspector, before he can be registered and with this he is just at the beginning of his learning. We are going to have to call him an engineer. Maybe we should, equally as well, as we call a doctor a doctor the day he steps out of college, or a lawyer a full-fledged practitioner the day he graduates.

In order to meet this requirement more training in college will have to supplant the three years' experience now gained in employment, and to do this broader fields of training will have

to be employed, which will easily require an additional year in college.

I heard something here that I listened to rather hurriedly, something about having a subprofession. What is a state board of examiners going to do with those fellows? What are they? They are not engineers. You say that they are not engineers but you give them some type of certificate of engineering. That is just going to raise a lot of trouble with the state boards, and the profession in general, leave out the word "engineering" or "engineer."

So I think it is very desirable to continue the accrediting of engineering schools and put up reasonable standards of technical training and an even larger degree of study which might tend to make a man. Men are what we want, not automatic figuring machines. We want a man who can go out and handle a job and know what to do. The engineer has to deal with the public as well as with his own organization. The most pitiful thing in the engineering world is to see the engineer, after he gets out of school, try to give an order to someone. He either talks too loud or says too much or admits that he does not know what he wants. Military training would be an excellent part of the engineer's training. It gives you training in obeying orders, and an engineer should certainly obey orders. Likewise, further on in military training you get the experience of giving orders and having them obeyed.

So whatever you can do in your colleges to build the technical training, to build character, to build up an understanding of engineering requirements and the honor that goes with that profession should be done, and you can well afford to spend five or six years.

NECROLOGY

GEORGE C. SHAAD

GEORGE C. SHAAD, Dean of the School of Engineering and Architecture, of the University of Kansas, and for 27 years a member of its faculty, died July 9, 1936, at Pasadena, California, while in attendance at the annual meeting of the American Institute of Electrical Engineers, of which he was a director.

Dean Shaad was born at Stratford, New York, in 1878. He received his early education in Stratford and then attended Pennsylvania State College from which he graduated in 1900. He received his E.E. degree from the same school in 1905. For two years after graduation he was in the employ of the General Electric Company at Schenectady, N. Y. In 1902 he accepted a position as instructor in Electrical Engineering at the University of Wisconsin under Professor D. C. Jackson. After two years he was promoted to an assistant professorship. In 1906 he was called to a similar position at the Massachusetts Institute of Technology by Professor Jackson where he was promoted to an associate professorship the following year. In 1909 he accepted the position of professor of Electrical Engineering at the University of Kansas, which position he held to the time of his death. In 1917 and 1918 he served as acting dean of the school during the absence of Dean Perley F. Walker and upon Dean Walker's death was promoted to the position of Dean of the School of Engineering and Architecture.

Dean Shaad was a very energetic man and a tireless worker. He was broad in his interests and a good executive. Because of these qualities he was often called upon to serve upon the governing boards of the various societies of which he was a member. At the time of his death he was serving as a director of the A. I. E. E. Two years ago he held the position of Vice-president of the S. P. E. E. In 1931 he was one of the councilors of the A. S. M. E. and last year he served as chairman of the Kansas City Section.

He was a member of many organizations and societies, including the following honor societies: Tau Beta Pi, Phi Kappa Phi, Sigma Xi, and Theta Tau. He was an enthusiastic worker in the Kansas Engineering Society, the Kiwanis Club, and Chamber of Commerce. He was a member of the State Board of Professional Engineers and for the past six years was the University Representative on the managing board of the Big Six Conference. This year

he was serving as chairman of the latter board. He had been recently appointed a member of the visiting committee for the local region of the Engineering Council for Professional Development.

On September 1, 1906, Dean Shaad was married to Miss Merthyr Tydvil Evans at West Pittston, Pa. Mrs. Shaad, three sons and one daughter survive him.

Although a man of high standards and ideals he was also a man of a kind and sympathetic heart. He loved people and abounded in unselfish activity yet he lived simply and without show or pretense.

His friends and associates miss him greatly.

The T-SQUARE PAGE

DEVOTED TO THE INTERESTS OF THE DIVISION OF ENGINEERING DRAWING

FRANK A. HEACOCK, EDITOR

Professor Frederic G. Higbee was the first editor of the T-Square Page which he started in 1930. For six years his keen insight, sound judgment, and constructive thought have been reflected in his excellent editorials. He has set up a high ideal and a fine example for the new editor.

Officers of the Engineering Drawing Division 1936–37

Chairman: John M. Russ, State University of Iowa
Secretary: H. D. Orth, University of Wisconsin
Editor of T-Square Page: Frank A. Heacock, Princeton University
Member of Executive Committee: A. S. Levens, University of Minnesota

1936 Engineering Drawing Competition

A committee of judges consisting of G. M. Phelps of Rensselaer, chairman, T. T. Aakhus of Nebraska, and A. S. Levens of Minnesota made the following awards in the 1936 drawing competition and announcement of the results was made at the dinner meeting of the Engineering Drawing Division at Madison, Saturday, June 20.

Class AP: A pencil drawing made with instruments, embodying an orthographic shape description (without dimensions).

Award	*College*	*Instructor*	*Student*
1	Purdue University	M. R. Graney	T. L. Tomaszewski
2	Tufts College	W. E. Farnham	Donald Newton

Class AT: Same as Class AP except that a pencil tracing is required (accompanied by the pencil drawing).

1	Armour Institute of Technology	C. E. Hammett	F. W. Cump, Jr.
2	Tufts College	W. E. Farnham	George E. Van Etten

Class AI: Same as Class AP except that an inked tracing is required (accompanied by the pencil drawing).

1	Tufts College	W. E. Farnham	Donald Bradbury
2	Georgia School of Technology	F. M. Hill	W. H. Beers

Class BP: A pencil drawing made with instruments, embodying shape description and size description (dimensions).

1	University of Illinois	R. S. Crossman	C. W. Filson
2	Purdue University	M. H. Bolds	C. E. Lacy

Class BT: Same as Class BP except that a pencil tracing is required (accompanied by the pencil drawing).

1	Armour Institute of Technology	W. A. Seegrist	J. A. Bobhill
2	University of Illinois	R. S. Crossman	S. W. Baker

Class BI: Same as Class BP except that an inked tracing is required (accompanied by the pencil drawing).

1	(No award of a first place)		
2	Georgia School of Technology	Frank Bogle	W. C. Grubb

Class C: A complete working (shop) drawing accompanied by an inked tracing.

1	Georgia School of Technology	H. S. Weber	W. J. Alfriend
2	University of Wisconsin	F. O. Griffith	H. W. Wright

Class D: A freehand pictorial sketch made with pencil and without using measurements.

1	Oregon State Agricultural College	E. C. Willey	Ed. Moore
2	Rice Institute	J. M. Hiller	F. D. Forristall

Class E: Lettering in pencil and directly in ink.

1	Texas Technological College	Mrs. M. B. Atkinson	Bob Jackson
2	University of Detroit	J. Gerardi	Guido Ferrara

Readers of this page are requested to send in suggestions, ideas, news, and articles of interest. Material should be sent to the editor at Princeton University, Princeton, New Jersey.

ENGLISH NOTES

DEVOTED TO THE INTERESTS OF TEACHERS OF ENGLISH IN ENGINEERING SCHOOLS

J. L. VAUGHAN, EDITOR

At the last meeting of the S. P. E. E., the Committee on English decided to publish in each issue of the S. P. E. E. JOURNAL a page devoted to the interests of teachers of English in the Society. They propose to use this section for the following purposes:

1. As a clearing house for the discussion of problems of interest to teachers of English in engineering schools. In other words, this column will be the place in which they can talk "shop."

2. As a forum in which administrative officers, teachers of other subjects, and practicing engineers can suggest ways in which instruction in English can be improved. The English Committee feels the need of criticism and helpful comments from other groups in the Society and in industry, and they hope that "English Notes" will serve as the meeting place of all people interested in good English.

All communications should be addressed to J. L. Vaughan, Engineering Department of the University of Virginia, Box 253, Charlottesville, Virginia.

CIVIL ENGINEERING DIVISION

L. E. GRINTER, *Chairman* — K. C. REYNOLDS, *Secretary*
H. C. BIRD — H. E. BABBITT
F. T. MAVIS — HALE SUTHERLAND

THE MADISON CONFERENCE

BY FRED L. PLUMMER

Chairman 1935–36, Case School of Applied Science

One Hundred and Fifty Teachers of Civil Engineering journeyed to Madison and the University of Wisconsin last June to hear and discuss the twenty-four papers presented before the special conference of the Civil Engineering Division, and to join with more than one thousand other individuals in celebrating the forty-fourth Annual Meeting of the Society. Perfect weather together with the natural beauty of the University Campus and the cordial welcome extended by the entire University Staff formed the background for one of the most delightful and inspiring of the meetings held by this Society.

The conference marked the close of one active year and the beginning of another for the Civil Engineering Division. Prof. H. E. Babbitt presented, at the opening session, a discussion of the desirability of establishing a clearing house to coördinate research. The question was further discussed by Dean O. M. Leland, Dean Carl S. Ell, Prof. F. T. Mavis, and later, and in more detail, at a special session sponsored by the Society Committee on Research. As a result of these discussions, a resolution was prepared and approved by the Council of the Division, and then presented through its Chairman to the Council of the Society, asking that a general committee be appointed to study this question and to recommend definite action. The Council of the Society received and approved this resolution, instructing President Hammond to appoint such a committee.

Attendance and discussion at the five group discussions and inspections which followed the opening session were most gratifying. The writer still regrets the fact that a Society Council Meeting prevented him from inspecting the Devil's Lake surveying camp and indulging in one of Prof. Ray S. Owen's broiled steaks.

Attendance at the Wednesday noon luncheon of the Division exceeded the capacity of the large dining room at the University Club. The afternoon session included a brief but interesting talk by C. A. P. Winslow, Director of the Forest Products Laboratory. Following the talk, a thorough inspection of this large and unique institution was held.

The Annual Dinner of the Civil Engineering Division was held Wednesday evening in Tripp Commons with about two hundred in attendance. Prof. F. M. Dawson, who was largely responsible for the excellent local arrangements for the Annual Meeting, extended a cordial welcome on behalf of Madison and the University. Prof. L. E. Grinter was elected Chairman of the Division and Prof. K. C. Reynolds, Secretary. Prof. Hale Sutherland and Prof. F. T. Mavis were elected to three year terms on the Council replacing Prof. Frank Kerekes and the writer. The Chairman presented the new officers and committee chairman following a few general remarks.

The general session and the five group discussions Thursday morning were devoted to teaching. President H. S. Rogers opened the meeting with a thought provoking paper on "Teaching Basic Courses." This was followed by a paper "Teaching Applied Courses" which was presented in such an enthusiastic and forceful manner by Prof. Frank Kerekes as to make everyone present at the meeting regret that he could not personally attend such a course, taught by Prof. Kerekes. The general session was closed by a discussion presented by Prof. Hale Sutherland. Each of the five group discussions included excellent papers and discussions, with the structural group leading in attendance.

The thanks of all are due Prof. W. S. Cottingham who was Chairman of the Committee in charge of all local arrangements for the conference of the Civil Engineering Division.

As retiring Chairman of the Division the writer wishes to pay tribute to the Council Members, Committee Chairmen, and Committee Members (about eighty of them) who were so largely responsible for the activities and successes of the Division during the year 1935–36. Your further interest and coöperation are urged in the hope that the meeting to be held at Cambridge next June may mark the close of a year of still greater accomplishments.

COLLEGE NOTES

University of Southern California.—Franklin O. Rose was for a number of years Head of the Department of Mathematics and Engineering at the Modesto, California, Junior College. He has been appointed Assistant Professor of General Engineering, in direct charge of courses in Engineering Drawing and Hydraulics. Professor Rose is a graduate of Stanford University in Civil Engineering, and received his Master's degree in Mathematics at the same institution. The professional degree "Civil Engineer" was awarded to him in May, 1936, by the University of California. Professor Rose has had an extensive background of engineering experience in railway and other civil engineering work. In 1932 he served as Assistant Professor of Mechanical Engineering at the University of California during the absence of Professor Cherry.

Winthrop G. Jones has been appointed graduate assistant in Electrical Engineering, and is to assist in radio courses and in the Electrical Laboratory. Mr. Jones graduated with highest honors from the University of Arizona with the degree B.S. in Electrical Engineering in June, 1936.

Yale University.—Samuel W. Dudley, Chairman of the Department of Mechanical Engineering since 1923, has entered upon his duties as Dean of the Yale School of Engineering. He was appointed to that position at the close of the last college year, succeeding Dean Robert E. Doherty who had resigned to become President of the Carnegie Institute of Technology, as noted in the March issue.

Dean Dudley is a native of New Haven. He graduated from Yale with the Ph.B. degree in 1900 and the M.E. degree in 1903. He then joined the Westinghouse Air Brake Company in Pittsburgh, and moved up through the engineering ranks in that organization to become Chief Engineer in 1914. He held that position until 1921, when he returned to Yale as Professor of Mechanical Engineering. Two years later he was made Chairman of the Department. While at Yale, Dean Dudley has continued an active interest in the application of braking mechanisms to railroad rolling stock, presenting many papers on topics in that field before various technical bodies. He has also served as a member of the University's Committee on Transportation.

At the Madison meeting of the S. P. E. E. Dean Dudley was elected to the Council. He is also Chairman of the Standing Committee on Publications of the A. S. M. E.

John Clayton Tracy became Professor of Civil Engineering, Emeritus, at the close of the last session, following an active connection with Yale that began when he enrolled as a student in the Sheffield Scientific School in 1887. In 1890 he received a Ph.B. degree, followed by a C.E. two years later. From 1891 to 1902 he was instructor in Civil Engineering; from 1902 to 1915, assistant professor; from 1915 to 1936, professor and chairman of the department. Professor Tracy is the author of many technical papers and books, of which his "Plane Surveying," published in 1907, is perhaps the most widely known. In addition to his duties with the University, he has throughout his life taken a very active part in civic and other public affairs. During the World War he was Director of the New Haven War Bureau of the Connecticut State Council of Defense. More recently he has been president of the New Haven Chamber of Commerce and of the New Haven Taxpayers' Association. In this latter capacity he will continue to serve the welfare of his community.

Roscoe H. Suttie, Associate Professor of Civil Engineering and a member of the Yale engineering faculty since 1913, has been made acting chairman of the department for the present session.

The only addition to the engineering faculty is Mr. Dennistoun W. Ver Planck, who comes to the Electrical Engineering Department as assistant professor. Mr. Ver Planck holds B.S. and M.S. degrees from the Massachusetts Institute of Technology. Since receiving the M.S. degree in 1929 he has been with the General Electric Company, where he has been actively engaged in the advanced study courses conducted by that company.

Mr. W. W. Sherwood, Assistant Professor of Electrical Engineering, resigned from the faculty at the close of the last session.

SECTIONS AND BRANCHES

The **New England Section** invites the members of the Society to attend its annual fall meeting which is to be held at the University of Vermont, Burlington, Vermont, Saturday, October 10, 1936.

The Committee on Program has planned to hold professional conferences in the morning beginning at 10:00 o'clock, a luncheon at noon, a general session beginning at 3:00 P.M., which will be devoted to a presentation and discussion of "The Personal Adjustment of the College Student," and a banquet in the evening.

The fall meeting of the New England Section was set for October 10 at the University of Vermont in order that members might take advantage of the holiday which comes on Monday, October 12, for a week-end trip through the mountains of New England.

Any member of the Committee on Program will be glad to furnish further information. The members of the Committee are as follows:

Carl S. Ell, Northeastern University, *Chairman*
Carleton E. Tucker, Massachusetts Institute of Technology, *Secretary*
George F. Eckhard, University of Vermont
Walter E. Farnham, Tufts College
Frank W. Garran, Dartmouth College
Theodore H. Morgan, Worcester Polytechnic Institute
Arthur E. Norton, Harvard University
William C. White, Northeastern University.

BOOK REVIEWS

Psychology of Human Relations for Executives, by J. L. ROSENSTEIN, McGraw-Hill Book Company, $2.50.

In the period since the World War, American Industrial Executives have had varied experiences with Psychology and Psychologists. Previously there was little knowledge in industry as to the meaning of the word "Psychology" or of its value and place in their personnel problems. Following the war came a period when certain executives became oversold on Psychology. Industry accepted not only trained and mature psychologists, but many whose background was hardly equal to the task of advising industry. By expecting rapid and concrete results from ofttimes immature advisors, many executives were so disappointed that the very name of psychology as applied to business signified to them something that had failed. They overlooked the fact that through the principles of psychology, as interpreted and applied by competent men, remarkable results have been attained in personnel work in industry.

The author of the book is consulting Psychologist to a large industrial concern. In the first few chapters he tells us, without using too many technical psychological terms, of the nature of psychology as applied to our actions and adjustments. There is an interesting chapter on personality. Then he enters the world of the worker and his job and tells us simply of just what a job means to the worker and how to approach his problems.

Perhaps of greatest interest to the reader are the two chapters "What is there in Psychology" and "What are Some of the Things Which Executives have Overlooked." I am sure that if every executive read these chapters he would know better what to expect from the psychologist and his point of view.

The title of the book might well be "Instructing Executives How to Use Psychology in Their Personnel Relations." It is refreshing to find final chapters containing practical examples, presumably gathered through the authors experiences. I enjoyed reading the book.

E. A. HOLBROOK

The Preparation of Engineering Reports, by Agg & Foster: Published by McGraw-Hill Book Co.

This book should prove to be of great help to (1) the young engineer who finds himself confronted with the problem of pre-

paring reports, and (2) the instructor desiring a good text or reference book for use in report writing courses.

The authors have classified reports generally under the headings of informal, formal, and form reports, discussing in separate chapters the nature, use and the various parts of each kind of a report.

Separate chapters are also devoted to (*a*) *Collection of Data for Reports;* suggesting the kind of data it would be necessary to collect for various assignments and how and where to get the data; (*b*) *Style and Arrangement;* in which is discussed such features as clearness, vocabulary, English, reader interest, transition phrases and mechanics of arrangement; and (*c*) *Diagrams, Charts, and Graphs;* in which the use of these great aids in report writing is amply covered by numerous examples.

The four Appendices covering Suggestions in Style, Abbreviations for Technical Terms, an Outline of a Course on the Preparation of Engineering Reports, and a List of Books and Reports for Reference are invaluable additions to the text material.

O. D. HUNT

Legal and Ethical Phases of Engineering. C. FRANCIS HARDING, Head of School of Electrical Engineering, Purdue University; and DONALD T. CANFIELD, Associate Professor of Electrical Engineering, Purdue University. McGraw-Hill Book Co., Inc. 432 pages. Price $4.00.

It is quite refreshing these days to pick up a text book in the engineering field that has been twenty years in preparation. Careful selection and presentation of the material is quite evident in this volume. The general classification is: Legal Status; The Engineer and the Law; Auxiliary Legal Relations; The Engineer and Society. Here is a well balanced text that should find wide adoption in the usual one semester course in most all senior engineering curriculæ.

Mathematics of Modern Engineering. ROBERT E. DOHERTY, President, Carnegie Institute of Technology, and ERNEST G. KELLER, Associate Professor of Applied Mathematics, University of Texas. John Wiley & Sons, Inc. 314 pages. Price $3.50.

Here is one of the most comprehensive and usable combination texts on Mathematics and Engineering that has appeared, and yet "It is neither a text on Mathematics nor one on engineering." This is largely explained by the fact that "the text was originally developed for the Advanced Course in Engineering of the General Electric Co." The book will find its greatest usefulness in the

graduate field, although selected portions might well be used in undergraduate work. The material selected and the method of presentation will appeal to the electrical engineering teacher and can be taught just as effectively by him as by the mathematics teacher. Space does not permit a proper outline of the contents of the text, it must be read to be fully appreciated.

H. E. DYCHE

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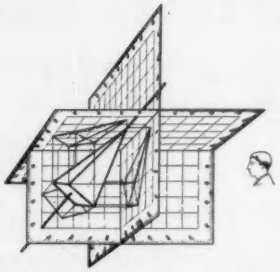

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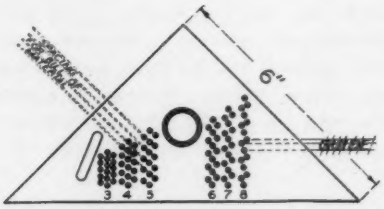

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